

A Self-learning Course

Planning and Managing Forestry Research

Volume V

Module 9

Managing Human Resources

Module 10

**Monitoring and Evaluating
Research Programs**



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Complete List of Modules

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PLANNING AND MANAGING FORESTRY RESEARCH: A SELF-LEARNING COURSE

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Planning and Managing Forestry Research
A Self-learning Course

Module 9
Managing Human Resources



International Union of Forestry Research Organizations
Special Programme for Developing Countries
Vienna, Austria

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Managing Human Resources

List of Study Units covered in the module:**Study Unit 9.1.**

Providing leadership

Study Unit 9.2.

Creating an appropriate environment and incentives

Study Unit 9.3.

Managing personnel effectively

Study Unit 9.4.

Providing training and education

It is essential to clearly understand that *people are the most important resource of any research organization*. As a manager of a forestry research organization, one of your most important responsibilities is to provide your staff with a structured organizational environment that encourages innovation and creativity. Your leadership and management style will determine to a great extent the performance of your research unit.

Forestry research managers and scientists are increasingly brought into contact with, and must learn to interact with, people from diverse cultures around the world. Working harmoniously in this multicultural global society requires sensitivity, adaptability, and diplomacy. Such skills cannot be easily taught in a self-study course. However, we can provide suggestions that may help you improve your skills in managing human resources.

By completing this module you'll learn to analyze your leadership ability and management style, and will better understand your impact on employee performance and motivation. We'll also show you what motivates scientists, and how to use this information to create incentive programs to stimulate researcher productivity and satisfaction. You'll discover (or perhaps better appreciate!) how having a well-trained cadre of people on your staff is crucial to research success. If you want to improve your personnel management and leadership skills, and be better able to build a more stimulating and satisfying working environment for your staff, then we think you'll find working through this module will be particularly rewarding.

Skill & Knowledge Assessment

Module 9 - Managing Human Resources



If you would like to find out how much you improve your skills and knowledge by studying this module, we suggest that you complete this exercise before beginning the module. This will establish your current level of skill and knowledge about the topics covered in this module. At the end of the module there is an identical skill and knowledge assessment form which you can complete once you have finished the module. By completing and comparing the before and after assessments, you can determine the extent to which you have improved your skills and knowledge.

Below are listed a number of skill and knowledge statements derived from the objectives of the study units in module 9. These are identical to those listed for this module in Study Unit 0.3 - Self-assessment of Training Needs, which you may have completed initially to guide your course of study. Please read each statement carefully and indicate with a checkmark the level that best describes your current skill or knowledge, from 1 to 5, using the following descriptions:

- 1 I cannot perform this skill, or I have not been exposed to the information.
- 2 I cannot perform this skill, but have observed the skill or have been exposed to the information.
- 3 I can perform the skill or express the knowledge with assistance from others.
- 4 I can perform the skill or express the knowledge without assistance from others.
- 5 I can perform the skill or express the knowledge well enough to instruct others.

Skill or Knowledge Statement	Your Level of Skill or Knowledge				
	1	2	3	4	5
a) List some qualities of a good leader.					
b) Describe several management styles and the circumstances where they are appropriate.					
c) Identify several types of incentives that can be used effectively to motivate forestry researchers.					
d) Describe the four career stages in the life of a research scientist.					
e) Prepare a staff recruitment plan to meet the present and future staffing needs of your organization.					
f) Evaluate individual scientist and staff performance, and take measures to correct deficiencies or improve performance.					
g) Assess training needs of the personnel you supervise to determine what knowledge and skills need to be enhanced to increase the effectiveness of your research organization.					
h) Identify obstacles within your organization that may impede the application of knowledge or skills newly acquired through training.					

Providing Leadership

Objectives

When you have completed this unit, you should be better able to:

- *list some qualities of a good leader and identify where you can improve your leadership ability;*
- *describe several management styles and the circumstances where they are most appropriate;*
- *identify the management style you use and rate its effectiveness; and*
- *provide better leadership to your organization's staff.*

Your job as leader in a research organization is to provide a work environment and reward system that will motivate scientists to become self-directing and productive. We're sure you're not surprised that this is no easy task!

We structured this unit to help you to become a more capable leader. We'll show you what makes a good leader, and what makes a poor one. You'll discover that there are many different types of leadership styles, each appropriate to special situations and personalities. You'll learn that leadership has to be flexible, and that managers need to know what leadership style is best used to motivate individual researchers. You'll also review some suggestions for developing more effective working relationships with those in positions of authority above you. By the time you finish this unit, we hope you will better understand the complexities of leadership, and will be eager to put your new knowledge into practice.

The Importance of Research Leadership

The job of the research manager is to utilize the people, funds, facilities, and other resources at their disposal to achieve the goals of the organization and accomplish its mission. Ranftl (1986) suggests that a productive manager:

- is competent at staffing;
- directs the organization's efforts effectively;

- is competent at handling complexities and problems, and in dealing with new concepts;
- is a skillful communicator; and
- supports and guides subordinates in their work and encourages their full participation.

To achieve these skills, the manager must develop an appropriate style of management and provide effective leadership to motivate

people within the organization to carry out their jobs. The manager's leadership and style of management can greatly influence the effectiveness and efficiency of the organization.

Providing effective leadership is one of the most important tasks of management. Leadership has been defined as:

"... a process by which one person attempts to influence the behavior of another (or a group) with the expressed purpose of achieving a goal (or goals)"

(Marcotte 1988, p. 168 and 170).

Chaudhuri (1986) describes the importance of leadership in successfully developing the Swaraj farming tractor in India.

"The success of the Swaraj project was to a very great extent due to leadership provided by the product champion who developed effective relationships with key persons, crusaded for the cause of indigenous technology and built a cohesive design team....the charismatic personality of the product champion ... was able to galvanize the members into a cohesive team."

To inspire people, managers must have a clear vision of where they are going, what it will take to get there, and why it is important to fulfill the mission, goals, and objectives of the organization. Father Theodore Hesburgh, former president of Notre Dame University, has said (Peters 1987):

"The very essence of leadership is [that] you have to have a vision. It's got to be a vision you articulate clearly and forcefully on every occasion. You can't blow an uncertain trumpet."

Leaders of forestry research organizations need to project a public image of leadership and competence by demonstrating:

- public speaking skills;
- ability to deal effectively with the various media;
- a grasp of key issues confronting society, particularly those relating to forestry; and
- ability to develop a wide range of personal contacts nationally and internationally.

Principles of Leadership

Managers can provide more effective leadership by adopting the following principles (adapted in part from Peters 1987):

- Develop an understanding of the organizational mission, its goals and objectives and what it stands for. Research managers must accept this mission, and use it as a guide to their activities.
- Develop a clear statement of the organization's mission. Mission statements should be simple and easily understood by everyone. This mission should be communicated to all employees of the organization, so that they understand what the organization is attempting to do, and who it is serving. There is no effective leadership if employees do not know where they are going, how they are to get there, or who it is that they are trying to serve.
- Manage actively and visibly. Employees should be made aware that someone is in charge of their work, and cares about the kind of job they do. Leaders should be visible and approachable, so that all employees know who is in charge and have some personal contact with them. Leaders should indicate by their actions the kind of work and level of performance they expect from their employees.
- Lead by personal example in carrying out job assignments. Employees are well aware of what their supervisors do, and on what issues, problems, and details they devote most of their time. What managers actually do reflects their priorities, and this is transmitted, consciously or unconsciously, to employees. Managers should determine what their top priorities are, and then devote most of their working time to those priorities. If managers devote little time to what they have declared to be urgent priorities, then employees are sure to interpret this as a sign that the other jobs on which the manager spends time are more important. By their actions, managers indicate to employees what their true priorities are, regardless of their stated priorities. This can lead to ambiguity and confusion among employees as to just what are the real priorities of the organization.
- Practice active listening. In today's rapidly changing world, managers must personally contact and listen closely to many different people to find out what is really going on in the world, to customers, employees, and others. For effective management there is no substitute for first-hand information.

- Delegate responsibility and authority to act. True leadership requires knowing when to relinquish personal control over some decisions, and delegate decision-making authority to subordinates. Competent employees must be given a chance to develop to their full capability by being given increasing levels of responsibility and decision-making authority. It is the responsibility of the leader to provide employees with a clear understanding of exactly what responsibilities they have, and to delegate authority to make decisions and take actions commensurate with that responsibility.

Alternative Management Styles

Several different styles of management are found within organizations. Two contrasting styles of management have been labeled Theory X and Theory Y (McGregor 1985). According to Marcotte (1988), **at the one extreme are managers with a Theory X style of management, who tend to believe that people:**

- lack integrity;
- are fundamentally lazy;
- avoid responsibility;
- are uninterested in achievement;
- are incapable of directing their own behavior;
- are indifferent to organizational needs;
- prefer to be directed by others;
- avoid decision making; and
- are not very bright.

In contrast, managers with a Theory Y style of management tend to believe that people:

- have integrity;
- work hard to achieve objectives to which they are committed;
- assume responsibility within these commitments;
- desire to achieve;
- are capable of directing their own behavior;
- want their organizations to succeed;
- are not passive and submissive;
- will make decisions within their commitments; and

- are not stupid.

With these views, managers with Theory X beliefs will:

- exercise tight controls;
- not delegate;
- keep all information to themselves;
- not trust subordinates; and
- drive, push, and shove people to achieve greater production.

Managers with Theory Y beliefs will:

- relax controls with those who have demonstrated responsibility;
- delegate responsibility and authority;
- share information;
- put greater trust in subordinates; and
- facilitate, encourage, and coach people to achieve organizational goals.

Some management styles appear to be more effective than others in leading research organizations. Bennell and Zuidema (1988) suggest that a participatory style of management has been found to be most effective in agricultural research organizations. This style is more in line with the Theory Y approach to management, and emphasizes a concern for both the researcher and the task to be performed. Research managers using the participatory style of management seek to involve researchers in key decisions. They recognize that while managers have the strategic knowledge of what needs to be done, researchers have the technical knowledge of what can be done and how it can be done. Working together and sharing their knowledge, managers and researchers can develop a research program that can be carried out to meet societal needs within the capabilities and resource constraints of the organization. Participation in managerial planning and decisions can generate greater employee commitment to plans and decisions of the organization.

Types of Leadership

The style of leadership or management greatly influences the organizational environment. Marcotte (1988) describes four basic leadership styles, based upon the degree of *direction* and *support* given to employees by a manager. Direction refers to one-way communication from the leader to the subordinate to define the work situation and direct the subordinate. Support refers to two-way communication between the leader and the subordinate to

communicate with, listen to, and encourage the subordinate. Marcotte suggests that different levels of direction and support may be appropriate in providing leadership in different situations:

1. **High direction, low support.**—A directing style of leadership, where the leader defines roles, makes decisions, and closely supervises. This style is most appropriate in supervising an enthusiastic beginner, who has high commitment, but low competence.
2. **High direction, high support.**—A coaching style of leadership, where the leader provides direction but attempts to incorporate the subordinate's input. This style is most appropriate where the subordinate has some competence, but lacks commitment.
3. **Low direction, high support.**—A supporting style of leadership, where the subordinate engages in problem solving and decision making, and the leader facilitates work and provides recognition. This style is most appropriate where the subordinate has competence, but lacks confidence.
4. **Low direction, low support.**—A delegating style of leadership, where the leader and subordinate jointly agree on problem definition and decision making is delegated to the subordinate. This style is most appropriate where the subordinate has competence and is motivated to achieve a high level of performance.

Successful leadership requires leaders to be flexible in their leadership approach. *They must know their staff well enough to know which style of leadership works best with each staff member to achieve the desired level of performance.*

Managerial leadership is the most important factor affecting an organization's productivity (Ranftl 1986). Although admitting that leadership is difficult to define, Ranftl (1986) developed a profile of desirable characteristics of an outstanding leader, based on a long-term study involving surveys of more than 3,500 managers in 59 major organizations in industry, government, and education in the United States.

According to Ranftl (1986), an outstanding leader:

Sets a particularly positive example as a person by:

- being unusually competent;
- having quality and quickness of mind;
- being particularly creative, innovative, and nontraditional—a unique individual;

- being highly self-motivated, self-confident, and self-directing;
- having extremely high integrity, values, and standards—standing above organizational politics;
- having unusually high motives, and a firm sense of purpose and commitment;
- being dedicated, and never self-serving—avoiding gamesmanship;
- having a strong positive orientation;
- displaying total self-command;
- having a high level of deserved self-respect and self-esteem;
- being clearly accepted as a leader;
- accepting and enjoying role of leader, but with humility;
- being willing to work harder than other members of the team;
- having particularly high vitality, stamina, and reserve energy;
- being continually searching, learning, developing, expanding, evolving; and
- being a “winner.”

Takes a dynamic approach to activities by:

- being action-oriented, with a compelling drive to accomplish and achieve;
- being quick to size up merit of people, ideas, and opportunities;
- using a persuasive personality rather than force of power to get things done;
- being tenacious—persevering in the face of obstacles;
- always seeing things through to successful completion;
- making decisions and doing what has to be done, even if it is unpopular and may result in criticism;
- continually seeking new and better ways;
- being visionary, skilled at predicting future technological and operational needs and applications; and
- always seeing new challenges and new fields to conquer.

Brings out the best in people by:

- being strongly people-oriented;
- exhibiting great respect for human dignity;

- being particularly skilled in dealing with and motivating people;
- having well-defined meaningful goals, and successfully inspiring associates to help achieve them;
- having confidence in people and effectively communicating that confidence;
- bringing about dynamic synergism within groups;
- being stimulating and catalytic—communicates a “can-do” attitude in all actions;
- maintaining an exciting organizational climate and instilling enthusiasm; and
- helping subordinates achieve their full potential.

Demonstrates great skill in directing day-to-day operations by:

- conceptually integrating all facets of the operation;
- having a strong sense of timing and limits—accurately sensing “when” and “how much” in each situation;
- having an uncanny knack for cutting through complexity;
- sorting out irrelevancies and identifying real driving factors;
- providing practical solutions to difficult problems, and successfully communicating solutions to others;
- sensing what might go wrong and developing contingency plans;
- maintaining control of all situations;
- performing with relative ease during times of stress; and
- displaying an “elegant” simplicity in all actions.

Perhaps the most effective leadership of all is management by example (Peters 1987). Research managers, by the organizational vision they espouse, their attitude towards employees, their personal work habits, and a host of other practices, provide an example, whether intended or not, of what kind of person they want their employees to be. If research managers want to elicit a certain type of behavior on the part of their employees, then they should practice what they preach, and set an example for them to follow.

Few people possess all of the traits of outstanding leadership, but some people possess more leadership traits than others. An important job of research management is to identify as early as possible those people within the organization that show leadership potential, so that they can receive training and experience to enhance their leadership ability.

Jain and Triandis (1990) provide further discussion of leadership styles in research and development organizations.

The Special Challenge of Research Leadership

Leadership within a research organization faces special challenges. The research manager must motivate a diverse group of highly trained, potentially creative individuals to work together to achieve organizational goals and objectives. The style of leadership will depend on the personality, confidence, values, and motivations of the manager; on the researchers' motivation, education, experience, commitment, and understanding of organizational goals; and on the resources, mandates, and responsiveness of the organization itself (Bennell and Zuidema 1988).

Providing effective leadership for a research organization requires recognizing the special nature of scientists, who make up the most important element of research. Scientists require, and often demand, special treatment. The progress of science is uncertain and subject to failures. It requires a great deal of creativity. There is considerable art in the pursuit of science. Because science is an uncertain, creative process, scientists cannot be managed as one would manage other employees. Managers of research organizations cannot rely upon tight control to direct scientists and enforce strict adherence to predetermined plans. There is little of the repetitive and routine in science that lends itself to clear, task-oriented job specification and measurement. We also believe that scientists working on forestry problems tend to differ from scientists in many other fields by being more field-oriented, applied, and interdisciplinary, reflecting the unique nature of forestry as a discipline.

Research does not lend itself to being governed by strong top-down direction and control. Yet, a research organization can benefit from strong leadership that understands scientific research and is sympathetic to its special problems. The job of leadership in a research organization is to provide a work environment and reward system that will motivate scientists to become self-directing and productive.

Special problems may be encountered when the manager is called upon to provide leadership to a multicultural work force. Increasingly, the world is becoming a world community, where people from a wide variety of national, racial, religious, and cultural backgrounds often find themselves working together. Where this occurs, managers will have to be particularly sensitive to the differences among people within the organization, and as to how they may perceive and act in response to their leadership. Special training programs targeted at specific working groups

within the organization may help to encourage harmonious working relationships among people of different backgrounds.

Working Effectively with Those Above You

One key element of leadership is developing good working relationships with those in positions of authority above you. Effective managers are concerned not only about improving their relationships with subordinates, but also with improving their relationships with their bosses. Even top level managers of forestry research organizations find themselves in the middle of a chain of responsibility. Although they are responsible for and have authority over the personnel within their own unit of organization, they must report to and seek support from still higher levels of authority within the larger organization or government. These higher administrative levels may set policies and priorities, give direction, and provide administrative and financial support to your research organization. Learning to get along with and influencing those in authority above you, or who are in a position to influence your organization and its work, is an important part of the manager's job.

The following suggestions (adapted from suggestions by Gabarro and Kotter 1993 and Hegarty 1984), may help you improve your relationships with your immediate supervisor and other administrative superiors:

Recognize the mutual dependence between a supervisor and a subordinate. You depend upon your subordinates to carry out and support the various research projects and programs. They, in turn, depend upon you to provide the resources and the environment needed to do their assigned work. So, too, must you rely upon your administrative superiors to provide the resources and environment needed to support your research program, and they must rely upon you to achieve the declared goals and objectives of your organization.

Improve your understanding of yourself and your supervisor. By better understanding each other's goals and objectives, management and work styles, and strengths and weaknesses, you will be able to interact more effectively.

Develop a clear understanding of mutual expectations between you and your supervisor. Although many supervisors are careful to clearly state exactly what they expect from their subordinates, many do not. Discussions with your supervisor may not cover all of the important considerations in your work assignments. Or, there may be hidden agendas of which you are unaware. It is worth spending extra time to ensure that your understanding of

your responsibilities, authority, and obligations coincides with that of your supervisor.

Insist on getting authority needed to carry out assigned responsibility. Accepting responsibility without having the authority to carry out that responsibility is a good recipe for failure. When assigned responsibility make sure that you have the authority to carry it out successfully. If authority is lacking, ask for it, pointing out the consequences of not having that authority.

Adjust your personal work style when working with your supervisor. Your own style of working may not always mesh well with your supervisor's style of working. When you work with your supervisor, adjust your way of working to make it more compatible with your supervisor's way of working so as to avoid conflicts that may erupt solely because of differing work styles.

Keep your supervisor informed. You like to be on top of things, to know what is going on. So does your supervisor. Keep your superiors well informed about things they must know. Don't let your supervisor be confronted by unpleasant surprises.

Make good use of the time and resources available for interacting with your supervisor. Your supervisor's time and your time are too valuable to waste. Use them wisely. Choose carefully the battles you want to fight. Fighting to change the status quo takes time and energy that must be taken away from other tasks. It also may generate ill will. One can draw upon obligations and good will of your administrative superiors for support, but only to a certain extent.

Make your supervisor look good. Contributing to your supervisor's success can contribute to your own. You and your supervisor are part of a management team within an organization. Often, the members of a team are judged by the performance of the team as a whole. To do this, you may have to allow your supervisor to take a substantial amount of credit for the work that you do. However, by making your supervisor and other administrative superiors look good, you can contribute towards your own success.

Establish a partnership with your supervisor. You are likely to develop a stronger support for your suggestions and proposals if your supervisor becomes personally interested and involved in some of your key activities. In this way, your supervisor becomes a partner with a personal stake in the outcomes.

Deal in solutions, not problems. Do not become a source of problems for your supervisor, but a source of solutions. Before going to your supervisor with a problem, take time to consider

alternative solutions. Providing superiors with suggested solutions makes their job easier. It has the added advantage of giving you the opportunity to put forth the solutions you favor, without having your supervisor impose an unwanted solution on you.

Publicize your contributions. You cannot assume that your superiors fully understand just how your activities contribute to solving the problems they face. When appropriate, you must speak up for yourself, to make sure that your superiors are aware of your contributions. If you want their support, you must be visible, and they must be aware of your accomplishments and capabilities. You cannot assume that others will speak up for you.

Be friendly and sociable with people. Cultivating a wide circle of acquaintances and developing a network of friends is important to career advancement. Everything else being equal, when looking for candidates to fill a vacant position, people think first about those with whom they have had personal contact and like and respect. A wide circle of friends also helps to keep you informed about developments in your organization and professional sphere of interest that could affect your future career.

Establish a rapport with assistants to administrative superiors. Assistants to higher level administrative officers often develop a close working relationship with them. They are usually well informed about their time schedule, their preferences about how information is presented, and any personal idiosyncrasies. Dealing courteously and professionally with assistants to your administrative superiors can help you work more effectively with them.

Activities¹

STUDY UNIT ACTIVITIES

Activity 1

This activity is designed to help you understand your leadership actions.

Each of the following statements describes a leadership action. In the space in front of each statement item write:

- 5 if you *always* behave that way;
- 4 if you *frequently* behave that way;
- 3 if you *occasionally* behave that way;
- 2 if you *seldom* behave that way; or
- 1 if you *never* behave that way.

Rating of**My Behavior****When I am a member of a group:**

- ___ 1. I offer facts and give my opinions, ideas, feelings, and information in order to help the group discussion.
- ___ 2. I warmly encourage all members of the group to participate. I am open to their ideas. I let them know I value their contributions to the group.
- ___ 3. I ask for facts, information, opinions, ideas, and feelings from the other group members in order to help the group discussion.
- ___ 4. I help communicate among group members by using good communication skills. I make sure that each group member understands what the others say.
- ___ 5. I give direction to the group by planning how to go on with the group work and by calling attention to the tasks that need to be done. I assign responsibilities to different group members.
- ___ 6. I tell jokes and suggest interesting ways of doing the work in order to reduce tension in the group and increase the fun we have working together.
- ___ 7. I pull together related ideas and suggestions made by group members and restate and summarize the major points discussed by the group.

¹The activities in this unit are adapted from Johnson and Johnson (1991) pages 153–62, with permission of the authors.

**Rating of
My Behavior**

When I am a member of a group:

- ___ 8. I observe the way the group is working and use my observations to help discuss how the group can work together better.
- ___ 9. I give the group energy. I encourage group members to work hard to achieve our goals.
- ___ 10. I promote the open discussion of conflicts among group members in order to resolve disagreements and increase group cohesiveness. I mediate conflicts among members when they seem unable to resolve them directly.
- ___ 11. I ask others to summarize what the group has been discussing in order to ensure that they understand group decisions and comprehend the material being discussed by the group.
- ___ 12. I express support, acceptance, and the liking for other members of the group and give appropriate praise when another member has taken a constructive action in the group.



STUDY UNIT ACTIVITIES

Comment 1

The purpose of this activity was to get your assessment of how you behave in a group situation, as a basis for judging your leadership style. We cannot predict how you will respond to this activity, but hope that you were able to evaluate your behavior patterns without too much trouble. The information you provided here is used in activity 2 to measure your personal inclination towards satisfying the demands of the task itself, or towards satisfying the needs and demands of the people working on the task.

Activity 2

This activity is designed to help you understand your personal inclination to task or maintenance actions.

The statements listed in Activity 1 characterize two types of actions, task actions and maintenance actions. Task actions emphasize getting the job done, and being strongly oriented toward the task. Maintenance actions are more concerned with the people working in the group, and with their interrelationships and individual needs.

To see whether you tend to be task oriented or maintenance oriented, copy your rating for each statement in Activity 1 into the appropriate blank. For instance, if you entered a "4" for #1 - "I offer facts and give my opinion...", enter "4" in #1 (give information and opinion) below. Then add the columns to get a total for your orientation toward task actions and maintenance actions. The higher the total score, the stronger is your orientation towards that type of action.

TASK ACTIONS**MAINTENANCE ACTIONS**

- | | |
|---------------------------------------|---------------------------------------|
| 1. give information and opinion _____ | 2. encourage participation _____ |
| 3. seek information and opinion _____ | 4. facilitate communication _____ |
| 5. define direction and role _____ | 6. relieve tension _____ |
| 7. summarize _____ | 8. observe process _____ |
| 9. energize _____ | 10. solve interpersonal problem _____ |
| 11. check comprehension _____ | 12. support and praise _____ |

Total for Task Actions _____**Total for Maintenance Actions** _____



Comment 2

The purpose of this activity is to measure your personal inclination towards satisfying the demands of the task itself, or towards satisfying the needs and demands of the people working on the task. Scores can range from 6, indicating a very low propensity toward this inclination, to 30 showing a very strong tendency in this approach. Thus, the higher the score, the higher is your inclination towards that behavior. Use the ranges below to help you gauge your own inclination toward task and maintenance approaches. Once you have determined your scores for the task and maintenance actions in question 3, use the information below to evaluate your own leadership style.

6 to 13	low inclination
14 to 22	moderate inclination
23 to 30	high inclination

Your Score for

Task, Maintenance Your Group Leadership Style

(low, low)

Only a minimum effort is given to getting the required work done. There is general noninvolvement with other group members. The person with this score may well be saying, "I really don't want to work on this activity," or, "I don't want to work with this group of people." Or they may be so inactive in the group as to have no influence whatsoever on other group members.

(low, high)

High value is placed on keeping good relationships within the group. Thoughtful attention is given to the needs of other members. The person with this score helps create a comfortable, friendly atmosphere and work tempo. However, the person may never help the group get any work accomplished.

(high, low)

Getting the job done is emphasized in a way that shows very little concern with group maintenance. Work is seen as important, and relationships among group members are ignored. The person with this score may take an army-drillmaster approach to leadership.

**Your Score for
Task, Maintenance Your Group Leadership Style**

(moderate, moderate) The task and maintenance needs of the group are balanced. The person with this score continually makes compromises between task needs and maintenance needs. Though a great compromiser, this person does not look for or find ways to creatively integrate task and maintenance activities for optimal productivity.

(high, high) When everyone plans and makes decisions together, all the members become committed to getting the task done as they build relationships of trust and respect. A high value is placed on sound, creative decisions that result in understanding and agreement. Ideas and opinions are sought and listened to, even when they differ from one's own. The group as a whole defines the task and works to get it done. The creative combining of both task and maintenance needs is encouraged.



Activity 3



This activity is designed to help you determine your interpersonal pattern.

The following exercise focuses on your interaction with groups of people. It may help you to think about how you conduct yourself in a group.

The actions listed below describe some of the ways people feel and act from time to time while working in groups. **How do you feel and act in groups?** *Check the five actions that best describe your behavior in groups as you see it.*

- | | |
|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> acquiesce | <input type="checkbox"/> disapprove |
| <input type="checkbox"/> advise | <input type="checkbox"/> evade |
| <input type="checkbox"/> agree | <input type="checkbox"/> initiate |
| <input type="checkbox"/> analyze | <input type="checkbox"/> judge |
| <input type="checkbox"/> assist | <input type="checkbox"/> lead |
| <input type="checkbox"/> concede | <input type="checkbox"/> oblige |
| <input type="checkbox"/> concur | <input type="checkbox"/> relinquish |
| <input type="checkbox"/> coordinate | <input type="checkbox"/> resist |
| <input type="checkbox"/> criticize | <input type="checkbox"/> retreat |
| <input type="checkbox"/> direct | <input type="checkbox"/> withdraw |



The responses you checked in this activity will be used in Activity 4 to describe your style of working within a group.

Comment 3

Activity 4



There are two underlying patterns of interpersonal behavior represented in the list above: dominance (authority or control) and sociability (intimacy or friendliness). Most people tend either to like to control things (high dominance) or to let others control things (low dominance). Similarly, most persons tend either to be warm and personal (high sociability) or to be somewhat cold and impersonal (low sociability). In the diagram below, circle the five actions you used to describe yourself in group activities (in Activity 3). Add the number of actions circled in each row and put the totals in the right-hand column. These two boxes should add up to five. Add the number of actions circled in each column and put the totals in the bottom row. The two boxes should add up to five also. The row and column with three or more actions circled represents your tendency in that pattern of interpersonal behavior.

To show you how this is done, here is an example where the actions picked are: assists, criticizes, initiates, judges, and leads. These are circled, and the number of actions circled in each row and column are totaled as shown below.

	High Dominance	Low Dominance	Number Circled In Each Row
High Sociability	Advises Coordinates Directs <u>Initiates</u> <u>Leads</u>	Acquiesces Agrees <u>Assists</u> Complies Obliges	3
Low Sociability	<u>Analyzes</u> <u>Criticizes</u> Disapproves <u>Judges</u> Resists	Concedes Evades Relinquishes Retreats Withdraws	2
Number Circled in Each Column	4	1	5

The person represented by these actions has some tendency (3) towards high sociability, and a strong tendency (4) towards high dominance.

Now, in the following table circle the five activities you picked in Activity 3, and enter the totals circled in each row and column to see how you rate yourself.

	High Dominance	Low Dominance	Number Circled In Each Row
High Sociability	Advises Coordinates Directs Initiates Leads	Acquiesces Agrees Assists Complies Obliges	
Low Sociability	Analyzes Criticizes Disapproves Judges Resists	Concedes Evades Relinquishes Retreats Withdraws	
Number Circled in Each Column			5



STUDY UNIT ACTIVITIES

Comment 4

Determining your own interpersonal style can provide important insights into how you relate to others as you go about your work. It should be clear that the best leaders would be those who were characterized by both high dominance and high sociability. These people would interact most successfully with others, and would have a tendency to take charge (that is, to lead). People with both low dominance and low sociability are not likely to be strong, successful leaders, since they would have chronic problems in their interpersonal relationships with others, and probably would not take charge when necessary.

Leadership can be learned. If you found certain weaknesses in your own leadership potential, don't be discouraged. Once identified, you can consciously address and strengthen any weaknesses you may have to improve your leadership abilities.

Remember, there is no perfect leader or a leadership style that fits all occasions. In fact, different situations require different approaches to leadership, a characteristic most good leaders understand.

Summary

The job of the research manager is to utilize the people, funds, facilities, and other resources at their disposal to achieve the goals of the organization and to accomplish its mission. To achieve these goals, managers must develop an appropriate style of management and provide effective leadership to motivate people within the organization to carry out their jobs. The manager's style of management and leadership can greatly affect the effectiveness and efficiency of the organization.

In this unit, you have learned about the various approaches to leadership, and you have assessed your own interpersonal and leadership styles. Perhaps you have even identified some leadership skills which you need to improve.

If you would like further information on this important topic, we urge you to obtain and review the references in the literature cited and other references listed at the end of the module, and read the article on leadership by Iyamabo (1992), reprinted for your use in the section on readings at the end of the module.

Creating an Appropriate Environment and Incentives

“In a real sense the job of the R&D manager is to create the right climate for research.”

(Jain and Triandis 1990)

Objectives

When you have completed this unit, you should be better able to:

- *identify several types of incentives that can be used effectively to motivate forestry researchers;*
- *evaluate your organization's incentive program, and suggest changes to better stimulate researcher productivity and satisfaction;*
- *describe the four career stages in the life of a research scientist; and*
- *improve your institution's organizational environment to increase scientist job satisfaction and work performance.*

People must be motivated to work hard to help achieve an organization's goals and objectives. Your organization undoubtedly has a variety of incentives already in place to encourage superior performance. In this unit, we'll take a close look at these and other incentives, particularly those that motivate scientists. You'll learn that scientists pass through career phases, each with its own set of motivating incentives. And scientists themselves are different and respond differently to the same incentive program. Finally, the entire organizational environment (framed in large part by your own leadership and management approach) affects researcher morale and productivity.

If you would like to learn more about this rather complicated business of motivating people to improve their performance, then work through this study unit. We think you'll find it interesting and rewarding!

The Influence of an Organizational Environment

Organizations tend to develop an internal culture that reflects the past and current leadership and management of the organization, the mission and goals of the organization, formal and informal rules and regulations that have been established and have evolved over time within the organization, and other factors (Wilkof 1989). All these factors form an informal and

formal environment within which the organization functions. This organizational environment can greatly affect employee performance. This is particularly true of scientist performance within research organizations. Managers of forestry research organizations, through their leadership and management style, affect the organizational environment within which all scientists and support personnel operate, and thus directly and indirectly affect the performance of the organization. Government and

organizational policies establish incentive and career ladder systems that affect the motivation of scientists and other employees within the organization.

Managers often develop a strong loyalty to the organization for which they work, and their actions are governed by their acceptance and adherence to organizational policies and procedures, and by the norms arising from inside the organization. In many organizations managers can generate a similar sense of organizational loyalty and belonging among the employees they supervise. But scientists differ from other employees in ways that suggest the need for a somewhat different environment in research organizations.

Scientists are strongly influenced by the scientific community to which they belong and by other factors outside of the organization within which they work. Many scientists are driven more by the need to secure acceptance and approval by the community of scientific peers to which they belong, than by organizational loyalties. To a considerable degree, their actions are governed by norms that arise from these external sources. Thus, scientists generally are not as strongly committed to the organization for which they work as managers and other employees may be. A scientific organization must create an environment that recognizes this dual allegiance of scientists to ideals and rewards that arise both outside of and within the organization, and that provides incentives for scientists to direct their work towards organizational goals.

By their training and education scientists have been encouraged to critically examine the world around them, and to question, test, and challenge generally accepted paradigms and authority. Thus, they tend to question, challenge, or sometimes ignore organizational rules and procedures which they think are unnecessary. This may create additional supervisory problems for research managers. Managers may have to take particular care to ensure that scientists understand and accept the need for particular organizational rules and procedures that other employees may take for granted.

Research requires a high degree of innovation and creativity. To be effective, a research organization must develop an environment that encourages innovation and creativity in meeting the goals and objectives of the organization. This requires flexibility in planning research, and a willingness to change plans as new challenges and promising directions emerge from ongoing research.

Research also requires operating funds to cover the costs of supplies, equipment, travel, technical support, maintenance of facilities, and other expenses. Many research organizations in

developing countries expend from 60 to 80 percent or more of their appropriations just for salaries, leaving little available for operating funds (Mook 1988). This lack of operating funds to conduct research can act as a disincentive to researchers. Without adequate funds to pursue their work, they may become so discouraged that they leave research and seek employment elsewhere. Research managers can affect the working environment by providing sufficient operating funds to conduct desired research programs, perhaps by controlling personnel levels or by other means.

Because managers are responsible for achieving the goals and objectives of the research organization, they must clearly communicate to their employees the need for working toward those goals and objectives. One way to do this is to work with each employee they supervise at the beginning of the year to develop a mutually acceptable list of specific accomplishments expected from that employee for the coming year. The accomplishments can be targeted towards the organization's goals and objectives. For scientists, such objectives may be in terms of specific study plans developed and approved, studies terminated and a final report written, experimental plots measured or installed, publications written, etc. Other employees would develop expected accomplishments in terms of their particular jobs.

Yet, managers also must be flexible in judging research accomplishments. Research is a risky venture with no assurance of success, particularly if the research is addressing important emerging problems or pioneering new frontiers of science. Despite the best planning, experiments go wrong and end in failure to achieve any useable result. Yet, scientists learn from failures. Research managers must recognize the inherent chances of failure in any research project, and allow for this in planning research, evaluating research performance, and establishing reward systems. Requiring success from every research project attempted, and requiring a fixed research output every year from every scientist, will almost certainly condemn a research program to mediocrity as scientists respond by proposing and pursuing a pedestrian program of research where success is almost certain.

Research managers need to create an organizational environment that generates an incentive system to reward achievement of organizational goals, that encourages and rewards creativity, innovation, and risk-taking, and that tolerates a degree of failure in the risky business of research.

Motivation Through Rewards and Incentives

People must be motivated to achieve an organization's goals and objectives. Organizations cannot motivate people. People can only motivate themselves. But organizations can provide appropriate incentives to motivate people to achieve organizational goals. These incentives may have to be both monetary and nonmonetary. To provide appropriate incentives, managers must understand what incentives are likely to be required to motivate the different kinds of people they supervise.

The basic question in the minds of scientists and other employees is, "If I am able to improve my performance, will this improved performance be recognized and rewarded in a way that is meaningful to me?" Efforts to motivate scientists and other employees must address this basic question. Badawy (1988) outlines seven principles of effective motivation:

- desired performance should be clearly defined and stated;
- a clear distinction should be made between a need for training and a need for motivation;
- reinforced behavior tends to be repeated;
- feedback on performance is an important form of reinforcement;
- rewards should be given for movement toward the desired behavior;
- reward is more effective than punishment in motivation; and
- rewards should follow soon after the behavior to be reinforced.

A common mistake in managing R&D projects is to assume that scientists and engineers are driven to seek the same rewards that other people seek. Many employees are primarily oriented towards monetary rewards and organizational goals. Although scientists and engineers are motivated by these same goals, they also are driven by other incentives and career goals. Scientists are committed to advancing knowledge and gaining professional recognition by peers in their chosen field of science (Badawy 1988). These rewards come from outside of the research organization for which they work. Managers must recognize this difference between scientists and other employees, and the differences in motivating factors among different employees, and provide appropriate incentives for the various people working for them. According to Chaudhuri (1986), in developing countries "...national research laboratories cannot attract good technologists through material incentives but must retain them by inspiring them to achieve challenging goals."

Various types of incentives for researchers have been suggested (Badawy 1988). These include:

Organizationally-oriented incentives:

- merit salary increases;
- promotions within career ladders;
- improved office space;
- increased technical or clerical assistance;
- increased challenge in job assignment; and
- special recognition and/or monetary reward for superior performance.

Professionally-oriented incentives:

- encouragement to publish;
- time off and expenses to attend professional meetings;
- greater freedom to come and go;
- better scientific equipment;
- sabbatical leave for education; and
- expenses and tuition for continuing education.

Bengston (1989) reported on the results of two mail surveys of 91 public forestry research institutions worldwide (46 from developing countries, 45 from developed countries). He concluded that although salary levels are important in motivating forestry researchers, other rewards also are perceived as effective in stimulating researcher productivity. The six categories of nonsalary awards include:

1. financial awards for outstanding productivity, quality, etc.;
2. nonfinancial awards and recognition;
3. additional research funding;
4. other benefits such as housing or transportation;
5. international travel; and
6. career advancement in research.

Although respondents from developing countries rated five of these nonsalary awards as having from moderate to great effectiveness in stimulating researcher productivity, most were used only occasionally in practice (figure 9.2.1). Financial awards were perceived as one of the most effective methods, but were the least used.

In practice, the research manager should recognize that it may be necessary to provide a variety of rewards in order to motivate the different individuals on his/her staff (Jain and Triandis 1990).

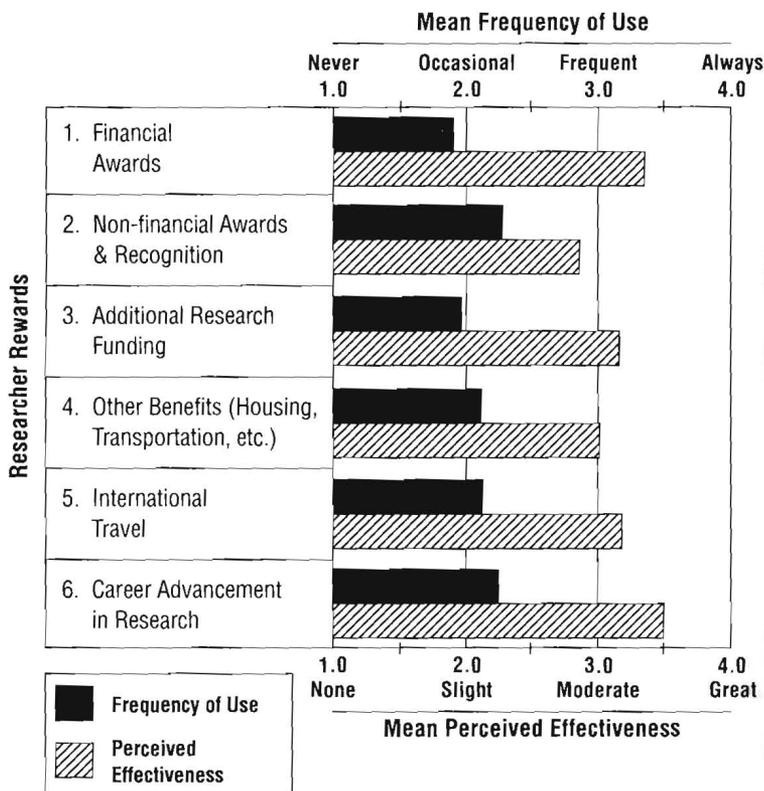


Figure 9.2.1. Mean frequency of use and perceived effectiveness in stimulating researcher productivity of six rewards for researchers in developing countries.

Source: Bengston 1989.

Research managers should devote considerable attention to the broad array of incentive mechanisms that are available to stimulate improved performance among research scientists and other employees. Above all, if the organization wishes to achieve its goals and objectives, then its system of rewards and incentives should be based on an individual's contribution towards those goals and objectives (Brooks 1968).

Career Ladders and Tenure Considerations

Scientists in many fields gain the knowledge and skills necessary to become an effective researcher in that field only after many years experience as a researcher. Thompson and Dalton (1976)

identified four career stages in the life of scientists, engineers, and managers in large research laboratories:

Stage 1. In stage one the scientist serves as an apprentice to a more senior scientist. This stage is characterized by:

- a. the work is never their own;
- b. the assignment is part of a larger project or activity; and
- c. much of the work is detailed and routine.

Stage 2. In stage two, the scientist:

- a. assumes responsibility for a definable part of a project or process;
- b. works with relative independence and produces significant results that are recognized as their own;
- c. begins to develop credibility and a reputation for competent work; and
- d. manages more of their own time and accepts more responsibility for outcomes.

Stage 3. In stage three, the scientist:

- a. develops a greater breadth of technical skills and applies those skills in several areas;
- b. begins to deal with the external environment of the organization (clients); and
- c. becomes involved in the development of people, and stimulates others through ideas and information (may become a mentor to younger scientists, or become a supervisor or manager).

Stage 4. In stage four, the scientist:

- a. exercises a significant influence over the future direction of the organization;
- b. engages in wide and varied interactions both inside and outside the organization; and
- c. sponsors and develops promising people who might fill key roles in the organization.

Not all scientists enter the organization at stage one, the apprentice level. Some more mature and senior scientists may be recruited to fill positions at the stage two, three, or (in rare cases) stage four level. Some may enter the organization with qualifications for a stage one position, but be assigned responsibilities normally given only to those who have matured to a stage two position. This is especially true in small organizations, where there may be only one person in any particular scientific discipline assigned to any one problem area. In small organizations it may not be possible to serve an apprenticeship under a more senior scientist.

Not everyone is motivated to continue to advance through the four career stages described earlier. Some may remain in stage one.

Others may be content to remain in stage two or three. If the research manager is to make effective use of people in the organization, they must identify those with the potential to advance further in their careers, and attempt to stimulate them to greater achievements.

As scientists gain experience and professional recognition, they expect to receive promotions and other organizational recognition for their growing competence. They expect to move from one stage in their career to another, steadily gaining more responsibility and authority.

Bennell (1988a) suggests that an optimal compensation scheme for agricultural researchers should:

- be simple and understandable;
- have grades based on job analysis and evaluation, and job comparison surveys;
- include career-long effective promotion and financial incentives;
- include job titles that identify seniority and competence among colleagues;
- have clearly specified promotion criteria based on demonstrated job performance;
- have provision for accelerated advancement for exceptionally competent and motivated researchers with a proven record of performance;
- provide for dual career ladders, with provision for advancement in both administration and research; and
- provide for consistent increases in income over a career, based on demonstrated performance and achievement.

Such a comprehensive compensation scheme rarely exists in practice, but it does suggest an ideal to strive for. Many governmental research agencies have no career ladders for those choosing to stay in research. The only career ladders are for those in the more traditional administrative positions. Career ladders within government agencies often are determined by civil service or other departments of government, and are outside the control of the research organization.

A lack of research-oriented career ladders can lead scientists to abandon their research career in favor of administrative or other lines of work so that they can advance professionally and obtain higher compensation. This is a valid option for many researchers who, after several years in research, discover that they would enjoy and do well in an administrative career. Without an open

career ladder for research scientists, managers of research organizations will find it difficult to keep good research scientists and motivate them to a high level of scientific achievement. *The lack of career ladders within research is one of the greatest barriers to be overcome in building an effective forestry research organization.*

In the absence of a research-oriented career ladder, the challenge to research managers is to motivate researchers by structuring their research jobs so as to increase job satisfaction. Hall and Louis (1988) found that a high level of job satisfaction by engineering and technical workers in industry was linked to the following factors:

- high levels of recognition for good job performance;
- high job challenge;
- high psychological success;
- high job involvement; and
- a strong sense of being valued, both inside and outside the company.

These are factors that research managers can control. In the absence of a research-oriented career ladder, it is up to research managers to make the job situation challenging and rewarding to those who choose to remain in a scientific career. Managers can increase the level of job satisfaction among scientists by improving the organizational environment. They can:

- provide a high level of recognition within the research organization for good research performance;
- stimulate recognition by outside groups for outstanding research performance that contributes to solving important scientific and societal problems, and make it possible for employees to accept that recognition;
- assign increased duties, responsibilities, and authority, so as to increase the challenge of a scientist's job;
- provide opportunities to develop personally and professionally and acquire new skills and interests, so as to achieve a high level of psychological success that contributes to job satisfaction; and
- communicate to scientists the strong sense of being valued by the research organization for their contributions to organizational goals and objectives.

Above all, research managers can greatly affect the research environment by their style of leadership, which was the subject of the previous study unit.



Comment 1

An organizational environment that generates an incentive system should have at least some of the following elements:

- high levels of recognition for good job performance;
- high job challenge;
- high psychological success;
- high job involvement; and
- a strong sense of being valued, both inside and outside the organization.

Further characteristics might include:

- compensation schemes that are simple and understandable;
- compensation grades based on job analysis and evaluation, and job comparison surveys;
- inclusion of effective career-long promotion and financial incentives;
- inclusion of job titles that identify seniority and competence;
- clearly specified promotion criteria based on demonstrated job performance;
- provision for accelerated advancement for exceptionally competent and motivated researchers with a proven record of performance;
- provision of dual career ladders with potential for advancement in both administration and research; and
- provision of consistent increases in income over a career, based on demonstrated performance and achievement.

We hope that you listed at least some of these elements of the organizational environment that help to motivate scientists in your research organization.

Activity 2



Below is a list of incentives that are commonly used to stimulate improved performance of researchers. *Add any other incentives to this list which you believe are or would be important in stimulating the performance of researchers in your organization. Then rank each incentive in this list according to how desirable and important you think it is in stimulating improved performance among the researchers on your staff. Rank the most desirable incentive as 1, the next most desirable as 2, and so on.*

Rank Incentive

- ___ Improved office space
- ___ Promotions within career ladders
- ___ Merit salary increases
- ___ Special recognition (internally and by outside groups) and/or monetary reward for superior performance
- ___ Increased challenge in job assignment
- ___ Increased technical or clerical assistance
- ___ Greater freedom to come and go
- ___ Better scientific equipment
- ___ Encouragement to publish
- ___ Expenses and tuition for continuing education
- ___ Sabbatical leave for education
- ___ Time off and expenses to attend professional meetings
- ___ _____
- ___ _____



Comment 2

We can't predict how you will rank this list of incentives, as each organization is different. Remember, you were asked to rate the incentives according to how important you thought they were *to your staff*, not to you personally.

Activity 3



Using the same list of incentives, ask several of your *researchers*, individually or as a group, to rank these incentives themselves and, if possible, arrive at a consensus regarding the relative value and importance of each of the listed incentives. **Do your research staff agree with your own assessment? Do you or they identify any other incentives that are of particular importance to your own organization? If so, write them below.**

Rank Incentive

- ___ Improved office space
- ___ Promotions within career ladders
- ___ Merit salary increases
- ___ Special recognition (internally and by outside groups) and/or monetary reward for superior performance
- ___ Increased challenge in job assignment
- ___ Increased technical or clerical assistance
- ___ Greater freedom to come and go
- ___ Better scientific equipment
- ___ Encouragement to publish
- ___ Expenses and tuition for continuing education
- ___ Sabbatical leave for education
- ___ Time off and expenses to attend professional meetings
- ___ _____
- ___ _____
- ___ _____



Comment 3

Again, we can't predict how your research staff would rank this list of incentives. The purpose of this activity is to obtain information about the incentives from the point of view of the researchers, who are the ones who must respond to the incentives that are put into place.

STUDY UNIT ACTIVITIES

Activity 4



Compare your ranking of incentives with the ranking given by your research staff, by listing the ranking from Activities 2 and 3 below.

Incentive	Ranking by	
	Manager	Researchers
Improved office space	_____	_____
Promotions within career ladders	_____	_____
Merit salary increases	_____	_____
Special recognition (internally and by outside groups) and/or monetary reward for superior performance	_____	_____
Increased challenge in job assignment	_____	_____
Increased technical or clerical assistance	_____	_____
Greater freedom to come and go	_____	_____
Better scientific equipment	_____	_____
Encouragement to publish	_____	_____
Expenses and tuition for continuing education	_____	_____
Sabbatical leave for education	_____	_____
Time off and expenses to attend professional meetings	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

STUDY UNIT ACTIVITIES

Activity 5



Are there any significant differences between your ranking and the ranking given by your research staff? If so, briefly describe below what actions you might take to resolve those differences in order to arrive at a consensus regarding the relative importance of the various incentives.



Comment 4 and 5

These activities are designed to identify how well you are perceiving the incentives that are likely to motivate the performance of your research staff. If their ratings differ significantly from yours, then perhaps you need to be in closer touch with your staff, to listen better, and to be more sensitive to their expressed and unexpressed needs and frustrations. We also hope that you and/or your staff discovered other incentives particular to your own organization that were seen to be important. Capitalizing on these special incentives can be particularly effective.

In a practical sense, it may not be possible to implement some of the most desirable incentives. For example, we suspect that one incentive that undoubtedly received a high rating was that of merit salary increases. However, your organization's sources of income may be severely limited, with little opportunity to significantly increase compensation. Thus, while the importance of compensation is highly ranked, it may not be feasible to implement this incentive. Other incentives to stimulate researcher motivation will therefore need to be utilized.

In the meantime however, the compensation issue cannot be ignored, since researchers will gradually move to positions in other organizations with higher levels of compensation. Thus, to retain your scientific staff, you as research manager must address these funding limitations, perhaps via a long-term plan for increasing your organization's or research unit's funding base. For more extensive information regarding financial support, please see Module 7.

Remember, people will work hard and be highly motivated by a number of factors besides monetary income. As research manager, you have available to you a number of incentives, some of which can be implemented at little to no additional cost to your organization.

Activity 6



From Activity 4, list the three most important incentives to improving research performance. For each incentive, briefly outline what actions would be needed to implement that incentive, what barriers to that action might exist, and what strategies might be used to overcome those barriers.

1. **Incentive:** _____
 - a. actions needed to implement incentive:

 - b. potential barriers to actions:

 - c. strategies to overcome barriers:

2. **Incentive:** _____
 - a. actions needed to implement incentive:

 - b. potential barriers to actions:

 - c. strategies to overcome barriers:

3. **Incentive:** _____
 - a. actions needed to implement incentive:

 - b. potential barriers to actions:

 - c. strategies to overcome barriers:

***Comment 6***

We don't know which incentives you and your researchers will choose to include here. The important point to be made by this lesson is that simply deciding on which incentives are most likely to motivate your people to a higher level of performance is not enough. It is the incentive itself, not its ranking, that motivates people. Unless the desirable incentives are actually implemented, they have no power to motivate people. This activity suggests the need to not only identify the key incentives, but also determine their feasibility and formulate a plan for implementing those that are feasible.

Summary

Motivating scientists is a complex and challenging job. Managers of forestry research organizations, through their leadership and management styles, affect the organizational environment within which all scientists and support personnel operate, and thus directly and indirectly affect the performance of the organization. Government and organizational policies establish incentive and career ladder systems that affect the motivation of scientists and other employees within the organization.

Your organization undoubtedly has a variety of incentives already in place to encourage superior performance. In this unit, we discussed how the importance of the organizational environment, the motivation of people through rewards and incentives, and career ladders and tenure considerations all affect the motivation and performance of scientists and support staff. Since scientists themselves are different and respond differently to the same incentive program, managers must be sensitive to the individual needs of their staff in order to maximize performance.

We hope that by working through this unit, you now have a better understanding of, and appreciation for, incentives and their effect on morale and productivity. By completing the activities you now have a personalized list of incentives that are effective and appropriate, and which should be implemented to complement or improve incentive structures already in place.

For further information and discussion of the issues raised in this study unit, you may wish to read the papers in the readings by Bengston (1989), *Research incentives in public forestry institutions*; and by Bennell and Zuidema (1988), *Human resource management for agricultural research: Overview and issues*, found at the end of this module. You also may wish to consult some of the references listed in the literature cited section at the end of this module.



Managing Personnel Effectively

Objectives

When you have worked through this unit, you should be better able to:

- *prepare a staff recruitment plan to meet the present and future staffing needs of your organization;*
- *assign duties and responsibilities, and delegate authority to your subordinates;*
- *evaluate individual scientist and staff performance using a performance evaluation format/system, and take measures to correct deficiencies or improve your employees' performance; and*
- *manage scientists working individually or collaboratively, and plan for the development of their individual capabilities.*

Managing people is perhaps one of the most challenging and difficult tasks you will face as a manager of research. But successfully managing people is the key to successfully achieving your organization's research goals. The two preceding study units (9.1 and 9.2) in this module discussed in some depth the importance of providing leadership and creating an appropriate environment and incentives for the personnel in your organization. This unit covers several additional topics that are important in managing personnel.

This unit is important! In it, you'll see how crucial it is to recruit the best people you can afford, and why it's so important to plan your recruitment far ahead of time. We'll show you ways to better manage the diverse personalities on your research staff, as well as how to assign duties and responsibilities, and delegate authority. You'll learn how to better manage individual and/or collaborative research efforts. And you'll learn how to evaluate scientist and staff performance, and how to help employees improve their performance. By the time you finish this unit, we hope you will have encountered a number of ideas and suggestions that will help you improve your skills in managing scientists and other personnel in your organization.

The Challenge of Managing Personnel Effectively

People are the most important resource of any research organization. One of the most difficult and important tasks facing a research manager is managing and directing the human resources within the

organization so as to achieve the goals and objectives of the organization. The challenge to managers is to recruit scientists and other staff who have the potential to carry out the planned research program, and then create an appropriate environment for doing research, assign appropriate duties and responsibilities, delegate the

authority required to carry out those duties, and reassign people as conditions warrant.

Managers are responsible for developing the capabilities of the scientists and support staff within the organization so they can carry out their work assignments effectively and efficiently. They must plan and provide opportunities for training and education to enhance performance of researchers and support personnel. They also must evaluate the performance of research and other personnel, and take whatever corrective action is indicated by this evaluation.

Recruitment

The key to developing a productive research organization lies in recruiting the right kind of people, including both scientists and support staff. Considerable thought and careful planning should go into every recruitment. One would not buy an expensive piece of equipment, or build an expensive facility, without careful planning and without comparing estimated performance with desired performance. *One of the largest investments in any research organization is the investment it makes in people.* Ultimately, the people recruited to work in a forestry research organization will strongly influence that organization's capacity and capability to do effective research. Thus, to the greatest extent possible the responsibility for recruitment should reside with research managers, and should not be left to an isolated manpower office at ministry headquarters (Sachdeva 1988).

Importance of planning for recruitment

Recruitment of scientists must be closely linked to long-term strategic research program plans, the organizational structure proposed to carry out those plans, projections of the resources and facilities available, and expected future funding levels. Recruitment should be planned well in advance. It should be based on expected vacancies in positions that must be filled and on new positions that are to be created, and should be in line with detailed program planning (Bennel and Zuidema 1988). Systematic long- and short-term manpower planning is essential. Because recruitment of scientists takes time, it must be planned carefully well in advance of actual requirements.

Although recruitment should seek to fit in with the organization's mission, goals, objectives, and plans, some flexibility is needed. At times scientists or technical personnel with the skills needed to carry out a desired research program may not be available. Because scientists tend to be specialists, with particular skills, expertise and knowledge, they generally are not interchangeable.

Thus, the scientific talents on a research staff dictate to a large extent the realizable goals and objectives of the organization. The availability of special skills and interests at the time of recruitment may dictate a reformulation of objectives and plans, and strongly influence the program of research that can be carried out effectively by the organization.

Forestry research often requires recruitment of people with a particular blend of knowledge, skills, and experience. Rarely are such people sitting around waiting to be hired upon demand. Finding the right person, gaining their interest in applying for a position, allowing time for them to terminate their present work and move to the new job location, and making proper arrangements for them to be hired, may take from several months to well over a year, even under the best of conditions. Top quality candidates for some specialties may become available only every few years. Such unavoidable delays can greatly disrupt recruitment and funding plans for new positions, and have a major impact on the attainment of the research organization's goals.

In some cases it may be necessary to plan for future staffing far enough in advance to allow for special educational or training programs to produce scientists with the desired qualifications. However, some advanced education or training may take several years to complete. Thus, *long-range planning is a necessary part of the future recruitment of scientists.*

It must be recognized that in many government organizations stringent rules and regulations govern the recruitment process, leaving relatively little flexibility for the research manager in recruiting personnel. In some cases, other branches of the organization or government may hire people to staff your organization, with little or no input from you. You may have little or no control over the process, and may have to accept such hiring decisions as final. Then there may be little you can do to plan for recruitment, and your chief task will be to provide the training and leadership necessary to ensure that those who are hired can do their work effectively. It may even be necessary to adjust your research program to take advantage of the special talents of those who are hired. However, in those cases where you can influence hiring decisions, the following discussion may be of some help in guiding the recruitment of scientists and other personnel.

Importance of recruiting well-qualified people

In recruiting scientists for a research organization, their potential quality as researchers is of critical importance. Scientists vary widely in their interests, abilities, and skills. Studies of scientist productivity in many fields have shown that the productivity of

scientists is a highly skewed distribution; a relatively small percentage of scientists in any field produce most of the publications (Moravcsik 1986).

A great deal of care and attention should be given to ensure that people of high research potential are recruited. The objective should not be just to fill an empty position with any available person. Wherever possible, recruitment should stress quality, not quantity. Otherwise, a research organization can become overloaded with people who contribute little or nothing to the research goals of the organization. Yet the recruitment of scientists usually is governed by the available supply. If a forestry research program is being developed in new directions, the supply of qualified candidates for any open position may be extremely limited.

One of the difficult decisions in recruiting is whether to recruit a more experienced researcher with a proven track record at a relatively high level of compensation, or a less experienced researcher at the apprentice level who shows considerable promise. Less experienced researchers generally are more readily available, will require considerably less investment in salary, and may have more flexibility in problem assignment with no long-term vested interest in a particular scientific subject or method. However, a younger scientist may require several years to gain the experience necessary to become an effective and productive researcher, and may lack the contacts within the profession that can facilitate research networking. And, to be realistic, many fail to develop into the productive and effective research scientist that research managers want to have on their staff. Because they have no proven record of past accomplishments, recruitment of young research scientists is always something of a gamble.

In contrast, the more experienced researcher can become productive in a relatively short time, recognize and be competent in attacking important research problems, attract funding and other scientific talent, and provide recognition for the organization through an established reputation in the field. But such a scientist does not come cheap, and may stretch the organization's budget to the limit. Further, the mature scientist may bring along a number of previous commitments that can take time away from a proposed research program.

In recruiting research personnel, public research institutes in some countries often face stiff competition from private industry and other organizations in terms of salaries and other job benefits, especially for those scientific and technical disciplines where the supply is low and the demand is high. In many developing countries it is difficult to compete with private industry and other

organizations for well-qualified researchers. Government salaries and advancement potential are often far below those available elsewhere. But scientists are not motivated solely by monetary rewards. If the research manager can create a dynamic research group that provides an exciting atmosphere to work in, and which clearly contributes to change on a national scale, this may overcome some of the competitive disadvantages the institution has in pay scales and promotion opportunities.

A critical attribute to be considered in recruiting scientists in an expanding organization is their potential for becoming mentors for the younger scientists that will be recruited later (Wolff 1987). Learning how to do research is best accomplished by serving an apprenticeship under the guidance of a mature, competent scientist. A few experienced research scientists in a growing research organization can serve as a nucleus to attract other scientists seeking opportunities to work with a respected scientist. Mature scientists also develop considerable interaction with the world community of science and with scientists in other fields, thus increasing the potential for collaboration with other organizations.

Technicians, technical support staff, and administrative staff provide essential services to researchers. Without adequate support, a considerable portion of a scientist's time may be lost to tasks that could better be carried out by specially trained technicians and clerical staff. Research planning should include estimates of the number and kind of scientific support staff required. In recruiting people for such positions it is important to choose qualified people, or people who can be successfully trained for the job. People who cannot or will not do the job become a drain on the financial resources and morale of any organization.

Managers often are reluctant to remove a person from a job because of poor performance. Under many government civil service rules and regulations, reassignment or dismissal for poor performance is difficult, at best. Thus, once hired, many people remain with an organization for a large part of their career. The investment a company makes in a person, once hired, over a ten-year period can be very large, including the costs of salary, fringe benefits, training, travel and other expenses, etc. If the person hired does not perform up to the standards expected, or performs unsatisfactorily, a large investment may provide no payoff to the organization. This is why recruitment of well-qualified people is so important to organizational productivity.

Funding and future budget constraints influence recruitment

Funding considerations may dictate the area of research for which recruitment can be done, the entrance salary level and thus the qualifications of potential candidates, and the technical and operational support that can be given to the position being filled. In actual practice, funding limitations and the availability of qualified candidates severely constrain the research manager's options in recruitment.

In developing recruitment plans, the impact of recruitment on future funding obligations should be considered. If there is a provision for annual or periodic salary advancement and/or promotion of forestry research personnel, then in recruiting people, the future funding requirements to support future staff, including anticipated salary increases, should be compared to the expected availability of research funds in the future. The recruitment and retention of personnel in a growing organization must be governed by a realistic appraisal of the future budget outlook. It is easy to overlook the fact that as scientists and other personnel mature, they may become eligible for promotion or within-grade advances in salary. This can create an ever-increasing demand for funds to meet payroll requirements, and an ever-shrinking amount of funds available to meet the operational expenses of the organization.

Alternatives to recruiting forestry research scientists

For some research work it may not be necessary to recruit and hire research scientists. There are other options, such as contracting with university or other research personnel to conduct the research, or providing competitive research grants to qualified researchers. This is a particularly advantageous approach in utilizing "soft" funding that is available over a short period of time, with no guarantees beyond a specified time period. The difficulty with such arrangements is that research managers lose direct control over the conduct of the research. In the case of grants, usually there is little control over the performance of the work once the grant is made on the basis of a proposal. However, contracts can be written so as to require close working relationships between those funding the work and those performing the work. Considerable skill is needed in selecting qualified researchers, in drawing up agreements that are effective in specifying the work to be performed, and in administering contracts and grants to ensure they are carried out according to the terms of the agreement. But carefully controlled, contracting for specific research services is a viable alternative to the recruitment

of additional personnel to the permanent work force of a research organization.

In seeking potential applicants for jobs, contracts, or grants, a forestry research organization should not overlook the considerable pool of talent that may be available in scientific fields other than forestry. In developing countries, and developed countries as well, considerable research that is directly related to forestry is carried out by scientists in disciplines other than forestry, and by nonforestry research organizations. Ecologists, wildlife biologists, anthropologists, hydrologists, agricultural economists, and many, many other scientific specialties often have expertise that has been devoted to research closely related to forestry. In the absence of qualified forestry personnel within a country, a forestry research manager should explore the use of scientists in allied disciplines that might be available, either through direct recruitment or through the use of contracts and research grants. This is especially important in considering research needs in the social sciences, because few forestry researchers have adequate training in these fields.

Assigning Duties and Responsibilities

In order to be effective, employees must have a clear understanding of their duties and responsibilities. It is the job of the employee's supervisor to ensure that:

- the employee has been assigned appropriate duties and responsibilities, and clearly understands them; and
- the duties and responsibilities assigned to employees are linked to the organizational mission, goals, and objectives.

Employees must have a clear understanding of what performance is expected of them in carrying out their duties and responsibilities. Preferably, they should participate in setting their goals and targets and the criteria by which their performance will be measured. A written job description, that clearly lays out what is expected of the employee, can greatly help both the supervisor and the employee to understand and agree upon the duties and responsibilities of the position. There are any number of formats for such a job description. The outline given in box 9.3.1 is suggested as only one of many appropriate formats.

Box 9.3.1. Format for a job description.**Identify the Job Context**

Current job title; department and division in which the job is situated; contribution the position makes to the overall mission of the division and department.

Responsibilities

Describe responsibilities or desired outcomes of the job clearly, quantifying wherever possible; record the means by which the responsibilities are to be accomplished.

Working Relationships

List the working relationships with supervisors, clients, colleagues, subordinates, and people of other departments that affect the successful accomplishment of the desired outcomes of the job.

Resources

List the resources to be used: people, equipment, money.

Supervision

Specify the line of supervision, the criteria and procedures by which accomplishments are to be evaluated, and the sources and frequency of feedback.

Wider Context

In addition to working relationships, list any steering committees, advisory groups, professional groups, or contacts outside the organization with which the incumbent is expected to interact.

Physical Conditions

Where is the work performed? What are the work hours? Does the job require stamina or accuracy? Does it entail travel? Are there any accident or health risks or stress factors?

Rewards

State grade, salary range, and benefits applicable.

Career

State the career prospects, including opportunities for promotion, lateral transfer, and relocation.

Source: *adapted from Marcotte 1990.*

Duties and responsibilities should be assigned based not only on the job the employee occupies, but also on the employee's abilities. People vary considerably in their ability to accept and make effective use of responsibility. In assigning responsibilities, managers must recognize that not all employees have equal abilities to effectively utilize the responsibilities assigned to them.

Research managers can use the assignment of duties and responsibilities as a means of training an individual for career

advancement. By increasing the level of responsibility and providing a new scope of duties, managers can challenge individuals to prepare for a move up the career ladder. But the performance of people with new duties and responsibilities must be monitored, and help should be provided when needed to assist people in better utilizing their new positions to achieve organizational objectives and their own personal goals.

According to Krebs (1971), the challenge facing research managers and administrators is:

“... to see to it that those who have proved themselves as productive research workers and have shown qualities of leadership are given full scope, above all sufficient time for research, and that those who, after having been given the chance, have not proved productive, as well as those who have lost their productiveness after an initial spurt, should be gently but firmly directed towards activities appropriate to their talent and inclination ...”

With a change in program emphasis or funding levels it may be necessary to reassign people to new areas of research or to new locations, with a change in duties and responsibilities. Such decisions are often difficult and may be resisted by the employees being reassigned.

Delegating Authority

Assigning duties and responsibilities to employees is not enough to ensure their effective performance. To be effective, employees need authority commensurate with their responsibilities. Authority refers to the extent to which the individual has control over work planning, methods of doing the job, approval for purchasing and travel, control of resources, flexibility of time, standards for acceptable performance levels, the hiring, assignment of responsibilities, and dismissal of subordinates, and many other factors.

The proper delegation of authority for carrying out responsibilities effectively was identified as an important component in developing an effective research organization at a recent conference of administrators of forestry research institutions in the Asia-Pacific region (Putti 1986). The research manager must delegate sufficient authority to each employee within the organization so that they can function effectively in fulfilling their responsibilities. A lack of authority may lead to employees refusing to accept assigned responsibilities in practice. Yet the delegation of authority beyond what is necessary may cause the manager to lose control of the organization.

Control over expenditures should be delegated to as low a level as possible. Blanket organizational restraints on travel, telephone use, supplies, personnel ceilings, use of computers, and other expenditures can lead to inefficiencies in research performance that can cost far more than the potential savings due to tighter control of expenditures (Brooks 1968). Some expenditure constraints may be imposed on the research organization by higher administrative levels or by funders, and may not be under the control of the research manager. But where they have the option, research managers should be wary of imposing such overall constraints as a way of controlling expenses. Rather, they can impose particular constraints on an individual basis where circumstances warrant, such as inexperience or abuse of expenditure privileges.

An effective way of delegating authority is to delegate a minimal amount of authority to new employees, closely monitor their use of the authority, and gradually delegate more authority as experience dictates. Under all conditions, there is a potential for the abuse of authority for personal gain. Research managers should continually monitor the use of delegated authority to control its misuse and abuse.

Performance Appraisal

Performance appraisal of each employee is a fundamental part of management. It is the key to evaluating how each employee is performing their assigned tasks. Although often considered distasteful and resisted by managers and employees alike, periodic performance appraisals provide one of the best means of monitoring and controlling the performance of employees in their assigned jobs. Such appraisals provide information useful for justifying promotions, identifying emerging problems, and developing training plans. The overriding concern in performance appraisal is to improve individual performance and productivity in a systematic and purposeful manner (Bennell 1988b).

The key to effective performance appraisal is for the manager to clearly enunciate well in advance what specific performance is expected of the employee during the forthcoming rating period. Working together, the manager and employee should develop a mutually-agreed-upon set of clear and realistic performance targets that are to be met during the rating period. This expected performance should be explained to the employee, and assurance sought that the employee understands and accepts the performance expectations. During the course of the rating period, such performance targets can be modified as conditions warrant, but again, it is important to involve the employee in any changes in performance standards.

Ideally, performance should be appraised continuously throughout the rating period, and corrective action taken as needed. At the end of the rating period, a formal performance appraisal should be completed. Such an appraisal should be in reference to the performance standards and targets established at the beginning of the rating period by the manager and the employee. Performance ratings should be based on the manager's judgement as to how well the employee completed the tasks agreed upon. It is unfair to rate an employee on the basis of unspecified expectations.

Zuidema (1988) suggests six factors that are useful in assessing the performance of researchers:

1. personal attributes—what they are;
2. technical knowledge—what they know;
3. professional skills—what they can do;
4. professional activities, behaviors—what they actually do;
5. outputs/results—what they accomplish; and
6. outcomes/impacts—consequences.

The first three factors are predictors of performance; the last three are more direct measures of actual performance. Criteria can be established in each of these categories to evaluate an individual's performance, but the evaluation of scientists poses particularly difficult problems.

Quantitative performance criteria can be readily established for routine, repetitive work. But much of scientific research is nonroutine, nonrepetitive, highly creative work, for which qualitative criteria are most appropriate. The danger of attempting to apply quantitative criteria for measuring scientific performance, such as number of publications produced, or number of studies completed, is that such criteria may lead scientists to avoid attempting high-risk research, and instead concentrate on safe, sure, pedestrian problems. Managers must balance the desire for quantitative criteria by which to measure scientific performance, with the need to encourage creativity and risk-taking among scientists.

In evaluating scientific research performance, a research organization should first of all be concerned about whether or not scientists are working on important and critical problems. Although the quality of scientific methodology is important, it matters little how good the methodology is if it is being applied to unimportant problems. Yet, important problems are often difficult problems. Scientists who work on difficult problems run the risk of failure. Science is a risky business. Research organizations

should not expect every research project to be successful. Some failures are inevitable. Performance evaluation standards that penalize scientists for research failures, may doom an organization to a program of mediocre research. In evaluating scientists, managers must find some way to tolerate occasional failures when scientists tackle difficult problems.

In evaluating scientists, managers may be forced to rely upon peer review for judging the scientific aspects of their work, because only scientific peers in a particular field of science are capable of judging scientific performance in that field. Yet, peer review usually provides only a partial evaluation of a scientist's performance. Managers should be aware of the overwhelming tendency of scientific peers to critique scientific work only on the basis of scientific method, technique, or logic (Maslow 1970). Rarely are scientists criticized for working on unimportant or irrelevant problems. It is the responsibility of managers to ensure that an important part of a scientist's performance appraisal includes a judgement as to the importance of the individual's research contributions to science or to society. An equally important evaluation criteria is the extent to which an individual's research contributes to the goals and objectives of the research unit and of the research organization.

Taking Corrective Action

The results of performance appraisals should be discussed with the person being appraised. Such a discussion should emphasize the strengths of employee performance, so the employee knows what was done correctly and is given recognition for positive performance. Discussions of performance present an opportunity to plan for employee development through advanced education, training, or special work assignments. Both supervisor and employee need to discuss employee short- and long-term goals and training needs, and jointly agree on specific actions to be taken to develop employee skills and knowledge during the next rating period.

Appraisal discussions also should focus on deficiencies in performance, where future performance needs to be improved. For many managers, criticizing the performance of employees is the most difficult part of performance appraisal. An important reason for performance appraisals is to identify weaknesses in employee performance, communicate these to the employee, and suggest means of improving performance in the future. In appraising performance, supervisors should not focus on fault-finding, but on pin-pointing what went wrong and what can be

done to correct potential performance deficiencies in the future. The exact approach taken in appraising performance and planning corrective actions may vary from one culture to another.

It is essential to remember that supervisors should speak with employees about their performance in private. Corrective action or direct criticism of an employee's behavior or performance in public should be avoided. This will only cause the employee to "lose face" before fellow workers, and is likely to result in further declines in performance. It also may result in the supervisor losing the respect of the employee, as well as others who witness the corrective action.

Supervisors should communicate to the employee specific deficiencies in performance in such a way that the employee recognizes the deficiencies. Encouraging self-appraisals of performance by employees may stimulate individuals to improve their performance on their own. However, managers must recognize that at times it may be necessary to take corrective action to force individuals to change their performance in desired directions, or to discipline employees for failing to improve up to expected standards.

Employees should be given a chance to correct observed performance deficiencies. Based on the performance appraisal, the supervisor should develop, preferably with the help of the employee, a plan to correct deficiencies within a given period of time through a series of specific actions. Proposed actions to correct performance deficiencies must be closely monitored, and decisive action taken to ensure that each deficiency is promptly remedied.

Weaknesses in employee performance indicate the need to improve employee/supervisor communication and interaction. Supervisors must take the initiative in stimulating more frequent contacts with the employee to discuss job performance. Managers need to ensure that there is increased communication between the supervisor and the employee. Considering the investment an organization makes in training an employee for a particular job, every effort should be made to improve employee performance so that they can contribute more effectively to the organization's goals and objectives. However, it must be recognized that there will be times when, for one reason or another, the performance of an employee declines too far to be tolerated by the organization, without disrupting its program of work. At that point, it may be necessary to reassign the employee to another job, transfer to another organization within the government, or (in extreme cases) terminate employment.

Recognizing Differences in Scientific Personalities

Experienced research managers recognize that scientists exhibit a variety of personality types and different basic approaches to research. For example, Maslow (1970) differentiates between means-centered scientists and problem-centered scientists in approaches to research:

“Means-centered scientists tend, in spite of themselves, to fit their problems to their techniques rather than the contrary. Their beginning question tends to be, Which problems can I attack with the techniques and equipment I now possess?, rather than what it should more often be, Which are the most pressing, the most crucial problems I could spend my time on?”

In supervising scientists, research managers need to be aware of such differences in scientific approaches to insure that not only is the research being done well, but that the problems selected for research are meaningful and important to science and to society.

In recruiting scientists, research managers should recognize the need for both analytical and creative abilities in people. Often, there is a tendency to evaluate the analytical skills of potential employees, and neglect the importance of creative skills. The experienced research manager recognizes that people utilize both a rational and an intuitive approach in dealing with the world. For a long time a myth has persisted, among scientists and nonscientists alike, that science relies on only one aspect of human nature—the logical-rational side. What often has been ignored is the important role of intuition in solving problems of science (Brown 1977). Albert Einstein wrote:

“I believe in intuition and inspiration ... at times I feel certain that I am right while not knowing the reason.... Imagination is more important than knowledge. For knowledge is limited, whereas imagination embraces the entire world, stimulating progress, giving birth to evolution.”

(Barry 1986, p. 14)

Scientists use intuition to develop the leaps of imagination needed to break out of conventional modes of thinking about the world and develop new hypotheses to explain the world. Scientists utilize the rational mode of thinking to logically analyze and test proposed hypotheses. Successful scientists exhibit both a strong intuitive ability to imagine possible solutions to scientific problems, and a strong analytical ability to rigorously analyze and test those solutions. In other words, they successfully integrate all of their capacities as a human being, both rational and intuitive.

Creativity is one of the key personality traits of successful researchers. In describing the creative personality, Austin (1978) states that successful scientists are always curious and "... intellectually restless, not satisfied with what is already well known." Austin suggests that the five most important personality traits of successful scientists are: curiosity, imagination, enthusiasm, discrimination, and persistence.

To enable research scientists to reach their full potential, research managers need to provide a working environment that encourages the full development of both the analytical and intuitive/creative traits of people.

Developing Individual Capabilities

Managers are responsible for encouraging and providing opportunities for continued professional and personal development of all of the people within the organization. This is done not only to satisfy the basic needs of individuals for continued growth and development, but to increase the performance of the organization.

Scientific knowledge, technologies, and skills need to be enhanced continually throughout the working life of individual scientists. Science changes rapidly, and established fields of science often expand in new and productive directions. It is increasingly difficult to keep up with the rapid pace at which new technologies and new methodologies in science appear. Keeping abreast of such developments, and developing the skills to utilize new developments in science, is essential for all scientists.

Providing appropriate training

If individuals are to grow and improve their capabilities, they must be provided with opportunities for acquiring new skills and knowledge. It is the job of the research manager to provide appropriate training to enhance job skills so that the organization's performance can be maintained or improved. This is a job that needs to be done carefully. Training can be very expensive in terms of productive job time lost, as well as the costs of particular training programs as well. These costs may be justified if the training improves skills and knowledge, if the results are then applied on the job, and if this leads to improved job performance. It is the manager's responsibility to weigh the potential usefulness of various training opportunities that might be available, and decide which employees are most likely to benefit from the particular training that might be offered.

Following any training activity, the manager has the responsibility for ensuring that the new knowledge and skills that employees gained from the training are applied on the job. The benefits to the

organization from training will be lost if, for whatever reason, the results cannot be applied within the organization. Informal plans for implementing training results should be considered in selecting and developing training programs for personnel.

Overcoming mid-career slumps

A major challenge to research managers is to find ways to encourage scientists to maintain and expand their research capabilities as they mature. Mid-career training and education are essential in providing new knowledge and capabilities to maturing scientists and, at times, in stimulating lagging careers. To avoid stagnation, continue their professional development, and increase their competence, scientists must be given regular opportunities to interact with colleagues and professional peers. This can be done through travel to make personal contacts with peers; attendance at seminars and workshops, short courses, national and international professional meetings and conferences; temporary reassignments to work with colleagues; job reassignment and/or transfer of station; special training courses; sabbatical leave; and in other ways. Such professional development can be costly, but the alternative, stagnation of promising professional scientists and plateauing of careers, can be even more costly to the organization in the long-run.

Many scientists, fearing change, fall into an unchanging routine approach to research. It is easy to continue to use the same problem-solving techniques that were successful in the past. For scientists, there are always endless loose ends to be attended to, additional tests of well-established principles to be made, additional trials to reconfirm previous findings, etc. Research on even the most limited subject can be endless. Yet, given the challenges facing forestry today, research managers cannot afford the luxury of having much of their scarce scientific talent addressing problems of limited importance to science and/or society. At times, to overcome individual inertia the research manager may have to prod scientists into accepting opportunities for continuing self-development and for tackling critical new problems, using incentives to stimulate participation. Often, research in a new area can have a stimulating effect on a scientist's career, even though it may at first be an unsettling experience to the individual.

Managing Research Teams

Although many scientists prefer to work alone on problems of their own choosing, they often are confronted by problems for which they have neither the knowledge nor the technical skills to satisfactorily resolve. Also, many if not most of today's most

pressing problems involve a multidisciplinary effort in order to develop effective solutions. In seeking to solve these multidisciplinary problems, scientists often must seek out and collaborate with other colleagues who have the special talents or knowledge that they need. There is increasing use of research teams in forestry research.

Teamwork is especially important when taking a problem-oriented approach to research, rather than a tool- or technique-oriented approach. A problem-solving, applications-oriented research approach often requires a team of researchers that represent different fields of knowledge, or that have different technical knowledge and skills. Managing multidisciplinary teams of scientists is difficult, particularly if the team assembled to work on a given problem has no experience in working together. Such teams often undergo considerable social strain in learning to talk with each other, in getting to understand each other's point of view, and in learning to work together (Hagstrom 1964). Conflicts arising among team members can require considerable managerial time to resolve.

The use of research teams introduces several problems into the management of research. Within a team, individual performance may be strongly influenced by the achievements of other team members. Thus, the evaluation of individual performance within a team may present more problems than evaluating the performance of individual scientists working alone, where research accomplishments are more clearly identified with a specific individual. One of the chief rewards in science is peer approval and acceptance within a particular scientific discipline. Peer recognition is typically given for accomplishments in advancing the frontiers of a scientific discipline. Those who work on teams to solve real-life problems may have less opportunity to gain stature within their discipline. Much of the team output may not be published in refereed scientific journals, and if it is it may have multiple authorship. Since many performance appraisal systems rely on peer approval, those scientists working on multidisciplinary problem-solving teams may not get the recognition they deserve.

Another concern managers must face in managing multidisciplinary research teams is the continuity of job assignments for team members, once the job assignment is completed or the team project is completed and the team is disbanded. The International Service for National Agricultural Research (ISNAR 1984) suggests that a long-term research capacity is best developed and maintained by having a research institution organized by scientific disciplines. This facilitates scientific networking, peer review, and personnel evaluation

systems. Such a system is in common use among forestry research institutions today. Under such a system, scientists from a particular discipline are assigned temporarily to problem-oriented research teams for a specified period of time, with the knowledge that they will return to their discipline-oriented groups when the team project ends.

To effectively manage multidisciplinary teams, the director and team leader must rise above their own scientific discipline and learn to manage broadly to understand and motivate scientists from other disciplines, who must learn to work together. The leader must identify the comparative advantage of each team member, and find ways to utilize that ability for the advantage of the team's output.

Although the management of research teams presents special challenges, such multi-disciplinary teams can be an effective way to direct research towards solving critical problems in the management and use of forest and related resources.

Resolving Conflicts

Inevitably, when people work together, or otherwise interact, conflicts arise. One of the most important yet frustrating jobs of the research manager is dealing with and resolving conflicts among various people and groups, both within and outside of the organization. Conflicts can arise between research scientists and technicians, between research scientists and administrative staff, between supervisors and subordinates, and between almost any individuals and/or groups of people that interact (Jain and Triandis 1990).

There is no single best approach to dealing with conflicts within organizations. Each individual manager is likely to have their own particular style of conflict resolution with which they feel most comfortable (Jain and Triandis 1990). Further, the most appropriate style may vary from one situation to another, depending upon the context of the conflict. In general, however, conflict resolution can be approached as a six-step process:

- Step 1. Identify and define the problem.** Objectively discuss the problem with those in conflict, and describe behavior without blaming or judging. Be sure the problem is clearly defined to everyone's satisfaction.
- Step 2. Brainstorm possible solutions.** Be creative and nonjudgemental as possible at this stage, and bring out as many potential solutions as possible from all who are involved in the conflict.

- Step 3. Evaluate the various solutions.** Assess the resources and constraints. This may produce alternatives or may modify solutions generated in step 2. Aim for a win-win solution, that is, a solution where everyone feels that they have gained.
- Step 4. Decide on a mutually acceptable solution.** Be absolutely sure there is a consensus among all participants so that they will actively support the solution.
- Step 5. Implement the solution.**
- Step 6. Evaluate the solution.** The accepted solution may need modification when someone has difficulty implementing the agreement, or if conditions change. Set a time and a place for reevaluation, as necessary.

At all stages, it is imperative that all participants are provided adequate time for providing input, so that they come to understand the opposing points of view, and can claim “ownership” for any solution that is proposed and mutually agreed upon.

Activities

STUDY UNIT ACTIVITIES

Activity 1



More than likely your organization already has some sort of system to characterize positions or jobs existing within the organization. There are many ways to describe a position and its duties, activities, and responsibilities. Use the model position description below² to describe a position (perhaps your own!) within your organization and compare with position descriptions currently in use.

Job Description Form

1. Identify Job Context

Current title.

Department and division in which the job is situated.

The contribution the position makes to the overall mission of the division and department.

2. Responsibilities

Describe responsibilities or desired outcomes of the job clearly, quantifying wherever possible, and record the means by which the responsibilities are to be accomplished.

²The exercises and their responses regarding delegation are derived from *Recruitment and Selection, ISNAR Training Series, Human Resource Management no. 4*, by Paul Marcotte 1990.

3. Working Relationships

List the working relationships with supervisors, clients, colleagues, subordinates, and people of other departments that affect the successful accomplishment of the desired outcomes of the job.

4. Resources

List the resources to be used: people, equipment, money.

5. Supervision

Specify the line of supervision, the criteria, and procedures by which accomplishments are evaluated, and the sources and frequency of feedback.

6. Wider Context

In addition to working relationships, list any steering committees, advisory groups, professional groups, or contacts outside the organization with which the incumbent is expected to interact.

7. Physical Conditions

Where is the work performed? What are the work hours?
Does the job require stamina or accuracy? Does it entail
travel? Are there any accident or health risks or stress factors?

8. Rewards

State grade, salary range, and benefits applicable.

9. Career

State the career prospects, including opportunities for
promotion, lateral transfer, and relocation.



Comment 1

How does this model position description, adapted from ISNAR, compare to position descriptions currently in use in your own organization? If you find that this model format is helpful, we have reproduced it here in an abbreviated format for photocopying.

JOB DESCRIPTION FORM

- 1. Identify Job Context**

- 2. Responsibilities**

- 3. Working Relationships**

- 4. Resources**

- 5. Supervision**

- 6. Wider Context**

- 7. Physical Conditions**

- 8. Rewards**

- 9. Career**

Activity 2



Determine your current success at assigning work by completing the exercise below.³ This activity is designed to help you assess your own approach to delegation and the assignment of duties.

Behavior	Yes	No	Unsure
• Do I do things my subordinates should do?	_____	_____	_____
• Do I bypass my subordinates when making decisions which are a part of their responsibilities?	_____	_____	_____
• Do my subordinates feel more could be delegated to them? What could be delegated?	_____	_____	_____
• Do my subordinates know specifically what <i>results</i> they must achieve?	_____	_____	_____
• Do they agree with me on performance standards established?	_____	_____	_____
• Is my follow-up adequate?	_____	_____	_____
• Am I accessible when my subordinates need to see me?	_____	_____	_____
• Do they feel they have sufficient authority to accomplish their assignments?	_____	_____	_____
• Do they exercise their authority without checking with me?	_____	_____	_____
• Do my subordinates seek additional responsibility?	_____	_____	_____
• Do I grant my people the right to be wrong and to learn from their mistakes?	_____	_____	_____
• If I were detailed to another job temporarily, could someone take my place?	_____	_____	_____

³The exercises and their responses regarding delegation are derived from a Supervisory Management and Training course, Office of Management, Supervisory and Management Occupations Training Division, Office of Washington Training and Development Services, WTDS 2002, SMOD 1/88: 1988. Chapter 4.

Behavior**Yes No Unsure**

- Is the development of people a major consideration when I delegate?

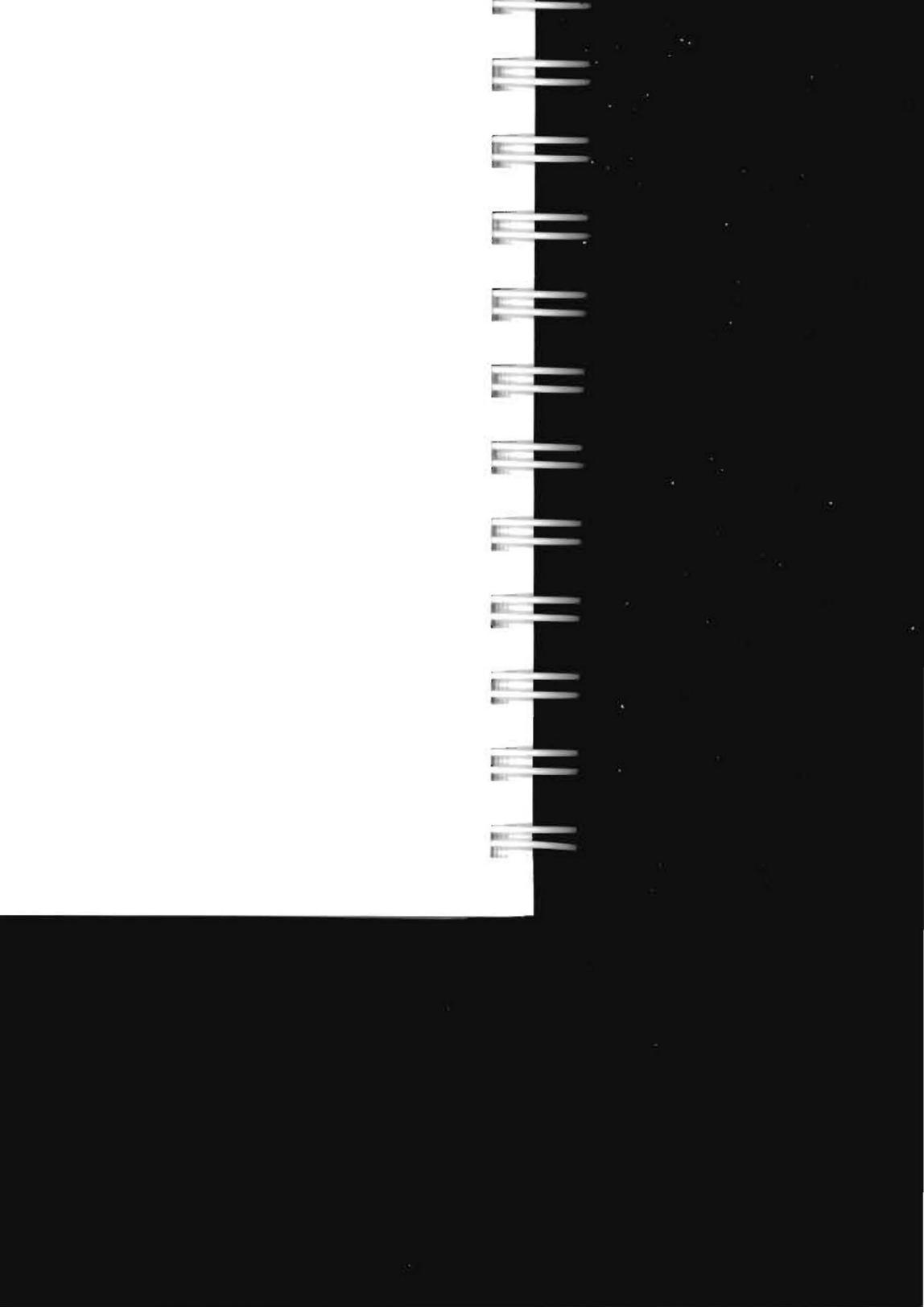
- a. Do I really know the strengths and weaknesses of my people?

- b. Have I delegated enough to them to justify this judgement?

- Are my subordinates consistently qualified for promotions when promotion time comes?

- Have I asked each subordinate what I could do, refrain from doing, or do so differently which could help them do their job better?

_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____





Comment 2

By completing this exercise, you may have some insights into your own personal style or approach to delegation. When trying to decide what tasks to delegate, ask yourself:

What could I delegate that is related to what the employee is doing now?

Which duties, if delegated, would have the most rewarding results?

What kind of experience do I want to give this particular employee to develop their fullest potential?

What can I delegate that will best utilize this employee's particular strengths and interests?

What duties can I delegate that will provide a challenge and a course of job satisfaction?

What sequences of tasks can I delegate to assure that each employee realizes some sense of achievement?

Remember, the best things to delegate include:

- repetitive tasks (e.g., reports that are periodically due);
- routine tasks (of not too great complexity); and
- tasks in which you are least well qualified and where one of your employees may have the required expertise.

To decide what degree of delegation is appropriate, consider such factors as your personality, the personality and capability of your subordinate, the nature of your relationship with the employee, the type of work or problem at issue, the time available, and the amount of top management interest in the matter.

Activity 3



Managing people inevitably involves managing conflict. Each manager has a different style or approach for managing conflict; complete the exercise below⁴ to determine your own conflict management style.

Read each of the proverbs carefully. Using the following scale, indicate how typical each proverb is of your actions in a conflict.

- 5 = very typical of the way I act in a conflict
- 4 = frequently typical of the way I act in a conflict
- 3 = sometimes typical of the way I act in a conflict
- 2 = seldom typical of the way I act in a conflict
- 1 = never typical of the way I act in a conflict

My Score

- ___ 1. It is easier to refrain than to retreat from a quarrel.
- ___ 2. If you cannot make a person think as you do, make them do as you think.
- ___ 3. Soft words win hard hearts.
- ___ 4. You scratch my back, and I'll scratch yours.
- ___ 5. Come now and let us reason together.
- ___ 6. When two quarrel, the person who keeps silent first is the most praiseworthy.
- ___ 7. Might overcomes right.
- ___ 8. Smooth words make smooth ways.
- ___ 9. Better half a loaf than no bread at all.
- ___ 10. Truth lies in knowledge, not in majority opinion.
- ___ 11. One who fights and runs away lives to fight another day.
- ___ 12. One hath conquered well that hath made their enemies flee.
- ___ 13. Kill your enemies with kindness.
- ___ 14. A fair exchange brings no quarrel.
- ___ 15. No person has the final answer but every person has a piece to contribute.
- ___ 16. Stay away from people who disagree with you.
- ___ 17. Fields are won by those who believe in winning.

⁴This exercise and its response are from Johnson and Johnson (1991) pages 304-308, with the permission of the authors.

- ___ 18. Kind words are worth much and cost little.
- ___ 19. Tit for tat is fair play.
- ___ 20. Only the person who is willing to give up their monopoly on truth can ever profit from the truths that others hold.
- ___ 21. Avoid quarrelsome people as they will only make your life miserable.
- ___ 22. A person who will not flee will make others flee.
- ___ 23. Soft words ensure harmony.
- ___ 24. One gift for another makes good friends.
- ___ 25. Bring your conflicts into the open and face them directly, only then will the best solution be discovered.
- ___ 26. The best way of handling conflicts is to avoid them.
- ___ 27. Put your foot down where you mean to stand.
- ___ 28. Gentleness will triumph over anger.
- ___ 29. Getting part of what you want is better than not getting anything at all.
- ___ 30. Frankness, honesty, and trust will move mountains.
- ___ 31. There is nothing so important you have to fight for it.
- ___ 32. There are two kinds of people in the world, the winners and the losers.
- ___ 33. When one hits you with a stone, hit them with a piece of cotton.
- ___ 34. When both give in halfway, a fair settlement is achieved.
- ___ 35. By digging and digging, the truth is discovered.

Now determine your conflict strategy by copying your scores into the table below, and totaling each column:

Withdrawing	Forcing	Smoothing	Compromising	Confronting
1. ____	2. ____	3. ____	4. ____	5. ____
6. ____	7. ____	8. ____	9. ____	10. ____
11. ____	12. ____	13. ____	14. ____	15. ____
16. ____	17. ____	18. ____	19. ____	20. ____
21. ____	22. ____	23. ____	24. ____	25. ____
26. ____	27. ____	28. ____	29. ____	30. ____
31. ____	32. ____	33. ____	34. ____	35. ____
Total ____				

The higher the total score for each conflict strategy, the more frequently you tend to use that strategy. The lower the total score for each category, the less frequently you tend to use that strategy.



Comment 3

According to Johnson and Johnson (1991), "dealing with a conflict is like going swimming in a cold lake. Some people like to test the water, stick their foot in, and enter slowly. Such people want to get used to the cold gradually. Other people like to take a running start and leap in. They want to get the cold shock over quickly. Different people use different strategies for managing conflicts."

This exercise helped you identify your general style of conflict management. The following statements characterize each style of conflict management:

Withdrawing.—Withdrawers seek to avoid conflicts. They give up their personal goals and relationships. They stay away from the issues over which the conflict is taking place and from the persons they are in conflict with. They believe it is hopeless to try to resolve conflicts. They feel helpless. They believe it is easier to withdraw (physically and psychologically) from a conflict than to face it.

Forcing.—Forcers try to overpower opponents by forcing them to accept their solution to the conflict. Their goals are highly important to them, and relationships are of minor importance. They seek to achieve their goals at all costs. They are not concerned with the needs of others. They do not care if others like or accept them. They assume that conflicts are settled by one person winning and one person losing. They want to be the winner. Winning gives them a sense of pride and achievement. Losing gives them a sense of weakness, inadequacy, and failure. They try to win by attacking, overpowering, overwhelming, and intimidating others.

Smoothing.—To smoothers, the relationship is of great importance while their own goals are of little importance. They want to be accepted and liked by others. They think that conflict should be avoided in favor of harmony and that people cannot discuss conflicts without damaging relationships. They are afraid that if the conflict continues, someone will get hurt, and that would ruin the relationship. They give up their goals to preserve the relationship. They say, "I'll give up my goals and let you have what you want, in order for you to like me." They try to smooth over the conflict out of fear of harming the relationship.

Compromising.—Compromisers are moderately concerned with their own goals and their relationships with others. They seek a compromise; they give up part of their goals and persuade the other person in a conflict to give up part of their goals. They seek a conflict solution in which both sides gain something—the middle ground between two extreme positions. They are willing to sacrifice part of their goals and relationships in order to find agreement for the common good.

Confronting.—Confronters highly value their own goals and relationships. They view conflicts as problems to be solved and seek a solution that achieves both their own goals and the goals of the other person. They see conflicts as a means of improving relationships by reducing tension between two persons. They try to begin a discussion that identifies the conflict as a problem. By seeking solutions that satisfy both themselves and the other person, confronters maintain the relationship. They are not satisfied until a solution is found that achieves their own goals and the other person's goals. And they are not satisfied until the tensions and negative feelings have been fully resolved.

Each conflict strategy is useful for certain situations. To effectively resolve conflicts within your organization, you will need to vary your actions according to the situation at hand.

Activity 4

The performance review and appraisal process is normally conducted as six interrelated sets of activities, allowing the manager to review past and current performance, and plan for future performance. These activities are listed in random order below.

- Communicate the assessment
- Set goals
- Jointly decide on a course of action
- Define job responsibilities
- Gather information
- Assess performance

In the space below, put the activities in what you think is the best order to maximize the effectiveness of the process.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____



Comment 4

The proper order for performance review and assessment activities is:

1. Define job responsibilities
2. Set goals
3. Gather information
4. Assess performance
5. Communicate the assessment
6. Jointly decide on a course of action

We hope you found this question relatively easy. Our purpose was simply to reinforce the point that performance review and assessment is a *process* of interrelated sets of activities, conducted in a step-by-step manner. Utilizing this process can enhance the productivity of both you and your staff.

Summary

People are the most important resource of any research organization. One of the most important tasks facing a research manager is managing and directing the human resources within an organization so as to achieve the goals and objectives of the organization. Managers are thus challenged daily to maximize the productivity and effectiveness of their staff.

Personnel management is of critical importance to the successful operation of a research organization. Managing people takes considerable skill and knowledge. This study unit was able to present only a broad overview of some of the more important aspects of personnel management. We intentionally presented this study unit in a broad, general manner so that you can apply these personnel management activities to any job or position class within your organization. By completing this unit, we hope you have improved your skills and understanding of staff selection and recruitment, delegation of authority, the assignment of duties and responsibilities, managing conflict, and conducting performance appraisals and evaluations.

For more information on personnel management, you may wish to consult ISNAR Working Paper 15, "Human resource management for agricultural research: overview and issues," by Bennell and Zuidema (1988), that is included in the readings at the end of this module, together with some of the literature cited and other references listed at the end of the module.

Providing Training and Education

Objectives

When you have completed this study unit you should be better able to:

- assess training needs of the personnel you supervise to determine what knowledge and skills need to be enhanced to increase the effectiveness of your research organization;
- systematically review staff training options that are available within or outside your organization;
- identify obstacles within your organization that may impede the application of knowledge or skills newly acquired through training; and
- develop a training plan for your organization that includes steps to monitor training activities and their resulting impacts on your organization.

It's no secret that well-trained staff are essential for the production of high-quality forestry research. In this study unit, we'll try to give you some basic tools and procedures which you can use to determine the status of your organization's staff training needs. We'll show you how to evaluate whether offered training courses are relevant to your organization's needs, and how to gauge the potential impacts of training programs. You'll learn ways to pinpoint obstacles that employees may encounter when they attempt to apply what they have learned, and how to overcome these obstacles. And finally, you'll learn how to assess the impact of training on your organization's operations.

Providing Training and Education

The term *education* is used here to mean acquisition of the base of knowledge that is needed by a competent scientist or by an effective manager. We most often associate education with formal programs in secondary schools, colleges, and universities. *Training*, on the other hand, is interpreted here to mean teaching specific functions and skills to those who will be, or already are, working with specific research activities or management and support functions.

Forestry research managers have indicated in a number of

surveys that the lack of adequately educated and trained scientists is one of the key barriers to more effective research (Bengston and Gregersen 1988; Iyamabo and El Lakany 1988; ITFFR 1988). As indicated in table 9.4.1, research managers in all regions of the world, and government and university research administrators, ranked training of scientists as the most important training and interactive activity, with training of technicians ranking second or third, along with development of networks.

Table 9.4.1. Priorities for increased investment in training and interactive activities. Where: 1 = most important; 5 = least important.

Training and Interactive Activities	All LDC	Africa	Asia	Latin America	Institutions	Universities
Training of scientists	1	1	1	1	1	1
Training of technicians	2	2	3	2	2	3
Research networks	3	3	2	3	3	2
Travel, meetings, and seminars	4	4	4	4	4	4
Others	*	*	*	*	*	*

* Insufficient number of respondents.

Developing Individual Capabilities

Young scientists need training to become effective and self-motivated scientists. Effective research is an art as well as a science. It is learned over time by doing, preferably under the direction and close supervision of a successful scientist (Bennell and Zuidema 1988). Having young scientists serve an apprenticeship under a more mature, competent, and productive scientist, who is able and willing to serve as a coach to help young scientists develop skills in identifying and solving scientific problems, is one of the most effective methods for developing competent scientists.

Most educational systems emphasize problem solving, and most young scientists are competent in using the latest methodologies and tools to solve particular types of problems. Yet one of the most important tasks in research is identifying or finding important researchable problems. For this task, the young scientist receives little or no training in formal educational courses (Dillion 1982). Problem identification skills are usually gained by experience and by working with mature scientists who have developed special skills in identifying critical problems.

A critical training need among forestry research scientists, particularly with younger ones, is to develop and improve the skills necessary for writing scientific papers for publication. Preparing papers for publication that will be subject to careful review and scrutiny by their peers, both before and after publication, can be an intimidating assignment for young professionals. But publishing the results of their research, and exposing their ideas and work to possible public criticism, is a necessary part of being a scientist. Young scientists may need

special help and encouragement from more experienced scientists to get started preparing and submitting such papers, and selecting appropriate scientific and technical outlets for their publication. This is a critical step in a scientist's career. Those who learn to successfully publish the results of their research become productive members of the research organization and of the scientific and technical communities. Those who do not may remain unproductive throughout their career. A special training effort may be needed to ensure that all research scientists have the skills, help, and encouragement necessary to write papers acceptable for scientific and technical publication.

On-the-job training is necessary to provide all employees with the knowledge and skills they require to function effectively. Such training may range from relatively informal instruction in office procedures and the use of office equipment by supervisors, to highly structured courses on scientific writing, the use of statistics in research design, word processing on computers, and similar subjects. The value of such training must be weighed carefully against the time lost from productive work during the training period. *For such training to be effective, the manager must insure that the organizational framework is designed to facilitate the use of new methods and technologies acquired by training.* There is little point in expending human and capital resources in training if the results cannot be applied on the job after the training is completed.

Those researchers who have managerial or administrative talent should receive opportunities to develop those skills. In many developing countries, forestry research managers lack experience in management, and thus could benefit from training in management skills (Bennell and Zuidema 1988). In those countries, a special effort needs to be made to provide research management training for promising management candidates in forestry research organizations.

It is equally important to develop the capabilities of the scientific and administrative staff. They, too, need on-the-job training to function effectively in their positions. They may need additional training to acquire new skills needed by the organization. Those who are being considered for or have been given supervisory and/or managerial responsibilities should be given some form of management training. Research performance is not likely to be up to expectations if the personnel who provide scientific and administrative support for that research are inadequately trained for their jobs.

Developing a Training Plan

A research organization needs a training plan in order to determine training requirements, the best deployment of training resources, and the logistics of training activities. Figure 9.4.1 provides an overview of what should be included in a forestry research training plan.

The first step in developing a training plan is to determine needs. These depend on the skills and disciplines needed to accomplish the organization's research objectives and goals, and the scientist and staff skills currently available to the organization.

The second step is to assess what resources are available for developing and implementing training activities and the types of activities which are most appropriate to accomplish the needs. Various types of training and education can be used. These include basic scientific education for researchers, technical training for technicians, general staff training for office personnel, and training in procedures for all personnel. In addition, of course, there is the basic education—both at the high school and the college and postgraduate levels—for the future scientists and managers of a country. All of these different options should be considered in developing the plan.

These two steps are discussed in more detail in the following sections.



Figure 9.4.1. Factors to consider in developing a training plan.

Training needs assessment

A training needs assessment is the first step in planning a formal training program. At the same time, of course, assessment of training needs should be an ongoing process. For example, any time that new procedures are adopted, new equipment is purchased, new personnel join the organization, or some problem of performance is identified, there will be a need to reassess training requirements.

Training needs are determined by what the organization wants to accomplish, what it needs to do to accomplish its objectives, who it has available to accomplish its objectives, and what skills and abilities those people have. The gap between what skills it needs

to accomplish its objectives and what skills and talents it has available provides an indication of potential training needs. We say *potential* in the sense that: (1) the organization may be able to go out and hire people with the skills to do what needs to be done, or (2) the gap between needed and available abilities may be caused by other factors influencing personnel performance and ability, e.g., incentives, work conditions, and supporting equipment.

An information needs and skill requirements table can be a useful tool in organizing training needs in relation to topics of importance, and types of individuals within an organization. The rows of such a table are the basic elements in a *management by objectives* framework, and show general categories of information and skill requirements for a forestry research organization. The columns indicate general categories of personnel in the organization. Table 9.4.2 provides an example of such a matrix for the knowledge and skills related to management required by administrative and scientific staff. (A similar matrix is needed for other types of training and for technicians, office, and other staff.) This type of table helps to define training needs in an organization by identifying which groups of people need what kind of information and skills.

As an example of how this can be applied, table 9.4.3 shows an assessment of the level of information and skill related to management needed by administrators, managers, and researchers in forestry research organizations in Africa. It is based on input provided by directors of research in some 16 African countries, at the 1989 IUFRO Workshop on Management of Forestry Research in Africa in Nairobi, Kenya. For example, the table indicates that the director general and other top administrators need understanding and skill in external relations, research program managers need some understanding and perhaps some skill, while researchers need perhaps only be aware of this topic with perhaps some general understanding. In contrast, researchers need understanding and skill in research methodology, but research managers and top administrators primarily need understanding.

Such matrices help to determine what types of information and skills are needed by various people within an organization. The next step is to appraise the existing knowledge and skill levels within the organization, and identify any gaps that should be filled by training. Such an appraisal can often be done informally by well-informed administrators and managers.

Table 9.4.2. Information needs and skill requirements for administrators, managers, and researchers in forestry research organizations, for identifying training needs.

Needs by type of trainee: 1 = understanding and skill
 2 = general understanding only
 3 = none or awareness only

Categories of Knowledge and Skills Related to Management	Personnel		
	Director General and Other Administrators	Research Program Managers	Researchers
1. Setting goals and objectives			
External relations			
Mission and goal formulation			
Setting internal policies			
2. Program planning			
Monitoring performance			
Assessing research capacity			
Assessing research needs			
Identifying gaps in capacity			
Programs/project design			
Financing			
3. Implementation and management			
Procurement (purchasing/contracting)			
Budgeting/accounting			
Operational mgt. (equipment/facilities)			
People management			
Training procedures			
Networking			
Research methodology			
4. Dissemination of results			
Documentation and information			
Extension and communication			

Note: This table deals with training for management; other types of personnel need training of a different type.

Table 9.4.3. Information needs and skill requirements for administrators, managers, and researchers in forestry research organizations, as identified at the 1989 IUFRO Workshop on Management of Forestry Research in Africa, Nairobi, Kenya.

Needs by type of trainee: 1 = understanding and skill
 2 = general understanding only
 3 = none or awareness only

Categories of Knowledge and Skills Related to Management	Personnel		
	Director General and Other Administrators	Research Program Managers	Researchers
1. Setting goals and objectives			
External relations	1.0	1.5	2.5
Mission and goal formulation	1.5	1.5	2.0
Setting internal policies	1.0		
2. Program planning			
Monitoring performance	1.0	1.0	1.5
Assessing research capacity	1.5	1.0	1.5
Assessing research needs	1.5	1.5	1.5
Identifying gaps in capacity	1.5	1.0	1.5
Programs/project design	1.5	1.5	1.0
Financing	1.0	1.5	2.0
3. Implementation and management			
Procurement (purchasing/contracting)	2.0	1.5	2.5
Budgeting/accounting	1.5	1.5	2.0
Operational mgt. (equipment/facilities)	1.5	1.5	1.5
People management	1.0	1.0	2.0
Training procedures	1.5	1.5	1.5
Networking	1.5	1.0	1.5
Research methodology	1.5	1.5	1.0
4. Dissemination of results			
Documentation and information	1.5	1.0	1.5
Extension and communication	2.0	1.5	1.5

Note: This table deals with training for management; other types of personnel need training of a different type.

A useful tool to identify the current level of skill or knowledge of an individual is the rating scheme used in rating skills and knowledge for each module of this course. Each person with managerial functions in the organization could be rated on the categories of knowledge and skills related to management shown in table 9.4.2, using the following five levels of skill or knowledge:

1. Cannot perform this skill or has not been exposed to this information.
2. Cannot perform this skill, but has observed the skill or been exposed to the information.
3. Can perform the skill or express the knowledge with assistance from others.
4. Can perform the skill or express the knowledge without assistance from others.
5. Can perform the skill or express the knowledge well enough to instruct others.

A management skill and knowledge assessment could be conducted for individuals using a form such as is shown in table 9.4.4. The results of this assessment for an individual in the organization can be compared with the general level of information needs and skill requirements for a person in the appropriate category of personnel shown in table 9.4.2. Such a comparison may indicate specific gaps in skill or knowledge levels that could be addressed by training.

Specific training needs will vary from one organization to another, and from time to time within the same organization as personnel and responsibilities change and training is completed.

To help develop an overview of training needs in forestry research organizations in Africa, the directors at the 1989 IUFRO workshop in Nairobi were asked to identify what they considered to be the most important management training needs in their organization. The results of this survey are summarized in table 9.4.5. Overall, the directors indicated that training on program and project design and planning ranked first, with training related to budgeting and finance and training related to identifying research needs and priorities ranking a close second and third. Fourth and fifth were training related to internal relations and motivation, and training related to performance measurement and evaluation.

Table 9.4.4. Individual assessment of existing levels of skill and knowledge related to the management of forestry research organizations.

Categories of Knowledge and Skills Related to Management	Your Level of Skill or Knowledge				
	1	2	3	4	5
1. Setting goals and objectives					
External relations					
Mission and goal formulation					
Setting internal policies					
2. Program planning					
Monitoring performance					
Assessing research capacity					
Assessing research needs					
Identifying gaps in capacity					
Programs/project design					
Financing					
Writing research proposals					
3. Implementation and management					
Procurement (purchasing/contracting)					
Budgeting/accounting					
Operational mgt. (equipment/facilities)					
People management					
Training procedures					
Networking					
Research methodology					
4. Dissemination of results					
Documentation and information					
Extension and communication					
Scientific and technical writing					

Table 9.4.5. Priority topics for management training in forestry research organizations of Africa: The views of African research directors.

Topic for Training	Priority Ranking
Program and project design and planning	1
Budgeting and finance	2
Identifying research needs and priorities	3
Internal relations and motivation	4
Performance measurement and evaluation	5
Recruitment procedures	6
External relations	7
Planning	8
Specification of rules and regulations	9
Monitoring and control functions	10
Dissemination of research results	11
Training of staff	12
Management of facilities and equipment	13
Management of input supplies	14

Source: Survey of 16 forestry research directors from French- and English-speaking African nations, IUFRO Workshop on Forestry Research Management, Nairobi, June-July 1989.

Options for meeting training and education needs

Once needs have been determined, the options for education and training programs are many. Which ones are chosen depends on, among other things: (1) resources available, (2) extent to which the organization can afford to be without key personnel while they are in training, and (3) the training and education institutions available in-country. In most developing countries, all three of these factors present a challenge to the research manager attempting to develop an adequate training program.

Table 9.4.6 provides an overview of different types of training for researchers and other staff that can be, and have been, used in national forestry research organizations. It also provides information on the types of objectives for which different types of training are appropriate, and it provides some additional information on typical durations, targets, and locations for different types of training activities.

Table 9.4.6. Typology of training in research organizations.

Type of Training	Objective	Duration	Target	Location
1. Introduction	<ul style="list-style-type: none"> To enable staff to become acquainted with organizational mandate, goals, rules, and regulations. To meet others and become more acquainted with the programs and activities within a short time. To facilitate socialization. 	Few days to one month	All new staff	In the organization
2. On the job	<ul style="list-style-type: none"> To enable researchers to learn research techniques and methods. To coach young researchers on the scientific and research process. 	Continuous	All, but emphasis on young researchers	Other institutions at own institute
3. Short-term (e.g., short-term travel grants)	<ul style="list-style-type: none"> To enable staff to acquire new skills, knowledge, and attitudes. 	Few days to six months	All, depending on topic	
4. Postgraduate or professional	<ul style="list-style-type: none"> To increase knowledge and upgrade skills and research capacity in general. To enable staff to achieve academic advancement. 	One year to 3 to 5 years	BSc or MSc degree holders	At local or overseas universities or institutions
5. Postdoctoral or long-term fellowships	<ul style="list-style-type: none"> To improve knowledge, skills, and professional contacts. To upgrade skills of researchers. 	Up to one year	MSc or PhD degree holders	At international research institute or other university institutions
6. Research management	<ul style="list-style-type: none"> To improve capacity for management of resources, develop skills in research planning and budgeting, monitoring and evaluation, and improve supervisory and management leadership, etc. 	Few days to one month	Mid- to senior-level research managers	National training international or regional seminars, conferences, and symposia
7. Technical	<ul style="list-style-type: none"> To upgrade expertise of technical personnel. 	A few months	Technical staff	At polytechnics international institutes, or other laboratories

Source: Adapted from Abe 1988.

Funding for training often is tied to international technical assistance and investment programs. In this case, the manager should carefully weigh the advantages and disadvantages of foreign education, often required to be in the donor country. Such education may be good in an academic sense; it will expose the employee to different viewpoints, approaches, or cultures; and it will make professional contacts that may prove useful in the future. However, it may not be relevant in terms of the problems facing the country. This often can be overcome through the use of split programs, where the scientists obtain their formal graduate education in the host country, but return to their own institution to conduct their required research. To do this successfully requires close cooperation, planning, and supervision between both the research and educational institutions. In the case of foreign supported programs, it may be possible to get temporary expatriate replacements for key people while they are in training. This has the double advantage of filling critical gaps and providing a ready source of inhouse training, if the foreign replacement is an experienced researcher.

Continuing education of researchers is a key factor in forestry research success. Ideally such continuing education might involve a short period out of the country or incountry, but away from the home organization, coupled with seminars or workshops in the home organization.

Using the Results of Training Most Effectively

A serious problem arising time and time again is the return of a newly trained, skilled researcher to a work environment where they will not be able to adequately utilize the newly learned knowledge and skills. This may be due to a lack of appropriate facilities, equipment, or other resources needed to apply the training. Or, the training may not be applied because the trainee is transferred to another location or type of job to which the training does not apply. The problem also can arise from the lack of adequate support funding, adequate incentives to apply the training, or an appropriate career ladder (related not only to promotion, but also to salary advances). The reluctance of supervisors or other research administrators to change established methods and procedures may also be a barrier to applying new skills. These issues all have to be considered in looking at training needs.

Evaluation of Training Programs

Evaluation attempts to show whether the training has achieved its stated objectives and to what extent it was effective, to what extent it has contributed to the organization as a whole, and to what extent it has

influenced future training and training-related decisions and actions. In other words, evaluation attempts to establish whether the right (training) action was taken.

(Abe 1988)

All training activity should be evaluated in some way, including an evaluation of how well the results of the training activity have been applied in practice, and what effect the application had on organizational performance (Abe, Marcotte, and Raab 1990). Too often, evaluation stops when the training activity is completed. It needs to continue after the training is completed if one really wants to assess the effectiveness of training. After all, the purpose of training is to get people to change what they are doing or how they are doing something. The training can only be thought of as successful if the anticipated changes do take place.

For a complete assessment of what training has accomplished, evaluations should be conducted before, during, and after the training (figure 9.4.2). These include evaluations of: initial levels of skills and knowledge to be imparted by the course; trainee satisfaction with the training; improvements in skills and knowledge; subsequent application of skills and knowledge on the job; and improved personal and organizational job performance.

One of the first steps (and, alas, sometimes the only step) in evaluating training activities is to survey those being trained to obtain their level of satisfaction with the contents, method of instruction, and trainers of the course (or other training activity), and obtain their comments and suggestions for changes. Such course evaluations may be conducted at intervals during the training course, perhaps at the end of each training unit as it is completed, or at the end of the entire course. This information can be used to improve the design of future courses to make them more satisfactory to those taking such courses. Such course changes may include changing the material presented, the way in which it is presented, the instructors, and even the type of trainees to which the course is presented. One important advantage of obtaining frequent feedback during the course from participants is that it provides instructors with the opportunity to make changes in the course as it progresses. However, this does require flexibility on the part of instructors. It does not work well where the curriculum of the course is fixed in advance, and the instructors cannot deviate from the prepared material.

Regardless of how satisfied trainees may have been with the training to which they were exposed, what really counts is whether or not they gained any skills or knowledge from the course. Thus, a key step in evaluating training activities is to determine after completion of training activities, what specific improvements in

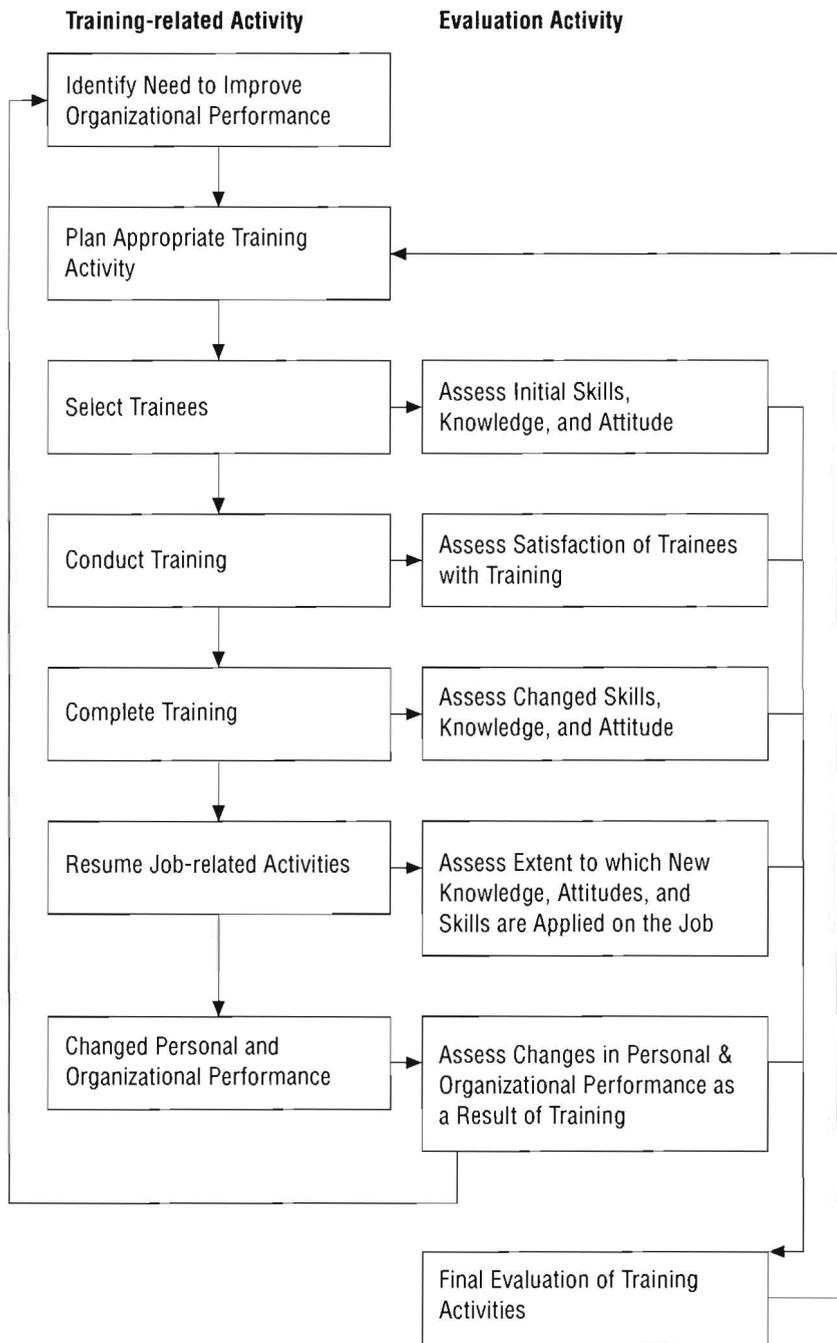


Figure 9.4.2. Five levels at which training outcomes should be evaluated (adapted from Abe, Marcotte, and Raab 1990).

skills and knowledge were brought about by the training. This implies that the objectives of the training have been clearly identified prior to the course. Participants in training activities should be tested for skill and knowledge levels prior to the course to establish a baseline against which changes are to be measured. Immediately following the course participants can be tested again to determine what specific improvements were brought about by the course. Similar tests conducted some time after the course can be used to determine how well the skills and knowledge were retained.

Training is conducted to help people improve the ways in which they carry out their current jobs within an organization, or to prepare them for a new job assignment. Thus, to determine training effectiveness it is necessary to determine not only how well skills and knowledge are improved by training, but also whether or not they subsequently are used on the job. Post-training surveys of participants can be used to determine whether or not they have had the opportunity to apply their training on the job. This also points out the importance, when selecting candidates for training, of determining whether or not the skills and knowledge to be imparted by the proposed training activity are a necessary part of that person's current or prospective job assignment, and whether they could be and are likely to be applied on the job after the training is completed.

A final step in determining training effectiveness is to assess how personal and organizational performance changed as a result of the training. This is often one of the more difficult tasks in evaluating the outcomes of training. Many factors other than training may contribute to changes in personal behavior and organizational success. It may be difficult to single out the specific contribution of a training activity to changes in personal and organizational performance. Nevertheless, some attempt should be made to document, to the extent possible, those changes that can reasonably be attributed to the training.

Activities

The following exercises will give you some practice in using a structured procedure for assessing and planning for your organization's training needs. Despite the fact that you are conducting this exercise by yourself, remember that developing an organizational training plan is best done by working with others who represent the various groups within the organization who will be affected by the plan. A broad participation in the planning process encourages individual and group acceptance (and thus *ownership*) of the results, ensures the inclusion of a variety of viewpoints, and reduces the potential for conflict.

There are six basic steps in designing and implementing a training program for research organizations:

1. Reviewing the organization's mission and goals (see study unit 2.5);
2. Assessing training needs;
3. Determining available resources and potential training impacts;
4. Identifying obstacles to implementing new skills and techniques;
5. Monitoring training effectiveness and impact on the organization; and
6. Developing the organization's training plan.

Each of these steps are covered in the activities that follow.





Comment 1

Be sure to complete this step! Remember, your organization's mission statement is the overall guide to your research orientation and direction. A review of this mission statement will help you define and determine your organization's training needs.

Activity 2



Step 2 - Use this table to rate **management** training needs for each employee category in your organization using the following scores:

1 = none or awareness only (low)

2 = general awareness only (moderate)

3 = understanding and skill (high)

When completed, the table can tell you at a glance where to direct your training resources and efforts.

For an example of how this table is used, see table 9.4.3.

Training Topics Knowledge and Skill Categories Related To Management	Category of Personnel		
	Directors and Other Top Administrators	Research Program Managers	Researchers
1 Setting Goals and Objectives			
Managing external relations			
Formulating mission and goals			
Setting internal policies			
Other			
2 Program Planning			
Monitoring performance			
Assessing research capacity			
Assessing research needs			
Identifying gaps in capacity			
Designing projects/programs			
Financing			
Other			
3 Implementation and Management			
Procurement (purchasing, contracting)			
Budgeting/accounting			
Operational management (equipment/facilities)			
People management			
Training procedures/methods			
Networking			
Research methodology			
Other			
4 Dissemination of Results			
Documentation and information			
Extension and communication			
Other			

This table can also be easily adapted to assess the training needs of other employees (including technicians, office, and other staff) simply by changing the training topics and the categories of employees to be trained.



Comment 2

This is the heart of the training planning process. This table enables you to quickly assess your organization's training needs by training topic, and target group to be trained. It can help you to effectively determine organizational weaknesses that can be addressed by training or education. Remember that you can easily adapt this table to your own situation to assess the training needs of other groups of employees in topics appropriate to their responsibilities.

Activity 3



Step 3 - Determining available resources and potential training impacts

Once the training needs have been determined, you will need to analyze the options and opportunities available for education and training. To do so will require that you consider at least three factors presented as questions below. *Answer these questions in the space provided regarding your own research organization.*

- A. What resources (financial etc.) for training or education are available?

- B. To what extent can your organization afford to be without these key personnel while they are in training?

- C. What training and education institutions are available incountry?

What other factors that affect options and opportunities for training and education do you think are important to your organization?



Comment 3

- A. Financial resources available for training could be drawn from local funds or core funding, or local sources of external funding. International technical assistance programs often include funds for training, or for temporary expatriate personnel that can fill key positions while the local personnel are in training.
- B. Determining which key positions can be temporarily vacant due to training induced absences can be a difficult and sensitive issue. In order for training and educational opportunities to be fully exploited, staff members need to know that their positions are secure while they are in training, and that they can return to work once training is completed. Key positions occasionally can be temporarily filled inhouse by several people sharing duties, or by utilizing international programs that provide expatriate personnel on a temporary basis.
- C. We expect that you would list local universities, research centers, and commercial training services (particularly in management or training). When considering local institutions, however, don't forget the considerable human resources and expertise available in your own organization! Staff members who have recently completed continuing education or training should also be encouraged to provide inhouse training to other staff members.



Comment 4

We have already listed a number of potential organizational obstacles to the diffusion of newly acquired skills and techniques. Perhaps you listed others, such as:

- Inappropriate techniques learned in training that have limited utility in your organization (that is, the training itself was not relevant to the overall needs of your organization).
- Lack of organizational mechanisms or structures by which a newly trained employee can attempt to change current procedures and implement the new techniques, skills, or knowledge.
- Lack of opportunity for the employee to use the newfound abilities due to training which was not matched to the employees day-to-day responsibilities and activities.

Did you think of other barriers to implementation particular to your own organization?

By identifying the obstacles to putting new knowledge and skills to work, you now have a much better chance to remove these barriers so that the new skills or techniques gained in training can be applied.

Each staff person trained should prepare a brief plan for implementing newly gained skills or techniques soon after they have finished their training program and resumed their job-related activities. This plan should include an analysis of barriers that the employee anticipates will inhibit application of the newly learned skills or techniques. Management personnel and the employee can then jointly review the plan and take specific steps (as appropriate) to encourage introduction and acceptance of the new techniques. The implementation plan also can be used as a monitoring and evaluation tool to gauge long-term training impacts on the organization (see step five).



Comment 5

We really can't anticipate what methods you recorded regarding training program monitoring and impact assessment. However, assessments periodically conducted by supervisors and others can be made to determine:

- progress of training and satisfaction level of trainees;
- evidence of improved employee knowledge, skills, and attitudes;
- application of new knowledge, skills and attitudes by the employee; and
- changes in organizational performance following training (impact).

In all cases, training evaluations should take place over time as the training activity progresses, and should involve trainees, trainers, supervisors or those administratively responsible for the trainees upon resumption of job activities, or outside evaluators.



Comment 6

Now that you have developed a training and continuing education plan for your own research organization, the challenge is to ensure that it will be implemented. Of course, your plan is just that, YOUR PLAN, and reflects only your opinions and viewpoints.

Remember, training and continuing education activities affect everyone in your organization. Training activities are often viewed as important benefits of employment, and thus can be volatile, and sometimes divisive issues in an organization. Planning training and education programs for your organization's staff should be a group effort in order to guarantee participation, encourage ownership, reduce conflicts, and ensure that the plan represents a variety of viewpoints and interests acceptable to all.

Summary

Clearly, training and continuing education are essential for producing high quality forestry research in today's rapidly changing world. By following the six steps outlined in this study unit in planning a training and education program, you will ensure that your organization's training requirements have been thoroughly reviewed. The plan will address the overall mission and goals of your organization. By assessing training and resource needs, and evaluating their potential impacts on organizational performance, it will help your organization focus and target its training efforts. Organizational obstacles to implementing newly acquired skills, knowledge, and techniques gained from training and education can be identified and overcome. And continued monitoring and evaluation, conducted both during the training process and after the employee has returned to work, improve future training efforts and enhance the success of your organization's research program.

The article by R. Z. Callaham (1989), *Training and Education for Management of RD&A Activities*, included as a reading at the end of this module, provides additional information on this topic, as do several of the references cited at the end of this module.

Skill & Knowledge Assessment

Module 9 - Managing Human Resources



Below are listed a number of skill and knowledge statements derived from the objectives of the study units in module 9. These are identical to those listed in the initial skill and knowledge assessment at the beginning of the module. Now that you have completed module 9, please read each statement carefully and indicate with a checkmark the level that best describes your current skill or knowledge, from 1 to 5, using the following descriptions:

- 1 I cannot perform this skill, or I have not been exposed to the information.
- 2 I cannot perform this skill, but have observed the skill or have been exposed to the information.
- 3 I can perform the skill or express the knowledge with assistance from others.
- 4 I can perform the skill or express the knowledge without assistance from others.
- 5 I can perform the skill or express the knowledge well enough to instruct others.

Skill or Knowledge Statement	Your Level of Skill or Knowledge				
	1	2	3	4	5
a) List some qualities of a good leader.					
b) Describe several management styles and the circumstances where they are appropriate.					
c) Identify several types of incentives that can be used effectively to motivate forestry researchers.					
d) Describe the four career stages in the life of a research scientist.					
e) Prepare a staff recruitment plan to meet the present and future staffing needs of your organization.					
f) Evaluate individual scientist and staff performance, and take measures to correct deficiencies or improve performance.					
g) Assess training needs of the personnel you supervise to determine what knowledge and skills need to be enhanced to increase the effectiveness of your research organization.					
h) Identify obstacles within your organization that may impede the application of knowledge or skills newly acquired through training.					

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ADDITIONAL SOURCES OF INFORMATION

- Marcotte, P. 1990. *Recruitment and selection*. ISNAR Training Series, Human Resource Management no. 4.
- ISNAR. *Human resource management in national agricultural research. Report of a workshop*, November 7-11, 1988. The Hague, Netherlands. 270 Pages.

READINGS FOR MODULE 9

The following readings have been selected to provide you with additional information related to the material covered in module 9. We hope you will find them of interest.

Bengston, D. N. 1989. Researcher incentives in public forestry institutions. In *The management of large-scale forestry research programs and projects*, ed. A. L. Lundgren, 135-45. General Technical Report NE-130. Broomall, PA: USDA Forest Service, Northeastern Forest Experiment Station. 236 pp.

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RESEARCHER INCENTIVES IN PUBLIC FORESTRY INSTITUTIONS

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INTRODUCTION

The array of incentives and rewards for scientists has frequently been identified as a critical factor influencing the productivity and effectiveness of research institutions. Scientists are the most important resource in research, and a strong system of incentives is essential for the development of this resource. The incentive system serves at least two key functions. First, it is central to an institution's ability to attract and retain highly qualified scientists. Inadequate rewards and ineffective incentive systems lead to a high turnover of scientists and seriously reduce the productive capacity of research institutions. Second, an appropriate incentive system will guide scientists to work for the goals of the research organization. The nature of incentives and rewards will have a profound effect on the type of research that scientists carry out. For example, rewarding scientists for the number of scientific publications produced will encourage more basic research; rewarding scientists for contacts with users and actual adoption of research findings will encourage more applied research (Elz 1984, Dada 1984).

But problems with incentive plans and systems of recognition and reward for scientists have been identified in public research institutions, particularly in less developed countries (LDC's). Low salaries for researchers relative to other professions have often created serious personnel problems (Nicholls and Cheosakul 1969, Pastore 1978, Callaham and Buckman 1982, Kim 1984). Researchers who remain in an institution with low salaries often accept major consultancies or second positions in order to adequately support themselves, thus limiting their ability to carry out a meaningful research effort. In addition, some observers claim that public research institutions in LDC's often fail to provide a challenging environment for research, with opportunities for professional advancement and freedom for creativity (Kim 1984). In a survey to determine the major causes of resignations at three agricultural research institutes in Latin America, Ardila et al. (1981) found that various factors unrelated to salaries — such as facilities, managerial style, and opportunity for professional advancement — were rated among the top 10 causes for resignation by scientists.

The consequences of inadequate rewards and inappropriate incentives may be devastating for a research institution. High turnover rates for research personnel have been widely reported. Because they have greater opportunities for employment elsewhere, the most highly trained and experienced scientists are most likely to leave; turnover rates for Ph.D. level scientists are often substantially higher than for M.S. and B.S. scientists (e.g., Ardila et al. 1981). To quote one observer: "Staff instability hampers sustained effort and results in incomplete projects or badly conducted research. Organizations with a long history of staff instability are unlikely to make the desired research breakthroughs" (Idachaba 1980: 27). Improving researcher incentive systems is therefore likely to be a key to strengthening research institutions in LDC's. A logical first step in improving an institution's incentive system is to attempt to evaluate the adequacy of the existing system. The purpose of this paper is to shed some light on how one might approach this task.

One caveat is in order before proceeding. An effective incentive and reward system for scientists is only one aspect of a system for managing human resources in research. Other

interrelated components or subsystems include a human resource planning system, a performance appraisal system, and a career management system (Badawy 1988). Although none of these components can be neglected, the incentive and reward system is vital for productive research organizations: "The biggest cause of relatively low-performance among potentially productive scientists is the confining work environment they face as professional scientists... Sociological research shows that *motivation* seems to count at least as much as native ability or training in producing good scientific research. The fundamental problem is to create a work environment in which the practising scientists show a high level of motivation and job involvement," (Vijh 1987: 10-11).

INCENTIVE INDICATORS

To be effective, an incentive system must be consistent with what motivates scientists. Nobel laureate Paul Samuelson has commented on the motivation of scientists as follows:

Scientists are as avaricious and competitive as Smithian businessmen. The coin they seek is not apples, nuts and yachts; nor is it coin itself, or power as that term is ordinarily used. Scholars seek fame. The fame they seek... is fame with their peers. (Samuelson 1986, p. 2F).

Samuelson is not alone in this view. Hans Selye, the father of the concept of stress, wrote that scientists are motivated by fame, not fortune (Saffran 1988). Scientists want recognition from other members of the "invisible college" of research in which they work. But various other motivators stem from personality traits common to productive scientists. We can classify these motivating factors as either extrinsic or intrinsic. Extrinsic or external rewards arise outside the actual doing of scientific research and are unrelated to the technical content. Examples include a good salary and various types of awards. Intrinsic or internal rewards are associated with a scientist's inner satisfaction in his or her work, including the satisfaction that comes from the freedom to pursue one's own ideas, the challenge of working on difficult problems, the opportunity to use specialized knowledge and skills, and so on. Intrinsic rewards are related to what has been called the 'joy of science' (Sinderman 1985). Although the most productive and creative scientists are likely motivated primarily by intrinsic rewards, that does not mean that the extrinsic rewards can be ignored. In their classic work, Pelz and Andrews (1966) show that adequate extrinsic rewards are necessary but not sufficient for a healthy incentive environment.

In this paper, I present a method for evaluating researcher incentives in an institution. The method is based on a set of five indicators of a healthy incentive environment: the first two correspond to various extrinsic rewards, and the last three relate to the kind of institutional environment that facilitates the attainment of various intrinsic rewards:

- (1) a measure of the adequacy of salaries,
- (2) an index of other extrinsic rewards, which includes six individual components,
- (3) a measure of the decision making power of scientists,
- (4) a measure of the adequacy of technical support for scientists, and
- (5) a measure of the degree of "bureaucratization" of a research organization, or the administrative burden placed on scientists.

This is obviously not a complete list of potential indicators, but these five do cover many of the most salient features of the incentive environment. With comparative data from a sample of research institutions, these indicators can be used to evaluate the relative strengths and weaknesses in an institution's incentive system. Data obtained from two mail surveys covering 91 public forestry research institutions worldwide — 46 from LDC's and 45 from developed countries (DC's) — were used in this study (Gregersen 1984, Bengston 1986). Respondents

were research administrators, usually the top administrator in an organization. Significant differences in incentive systems between DC's and LDC's and between government research institutes and universities are analyzed. The following sections examine each of the five incentive indicators in turn.

1. Relative Salary of Scientists

The salary of researchers is an extrinsic reward that has often been identified as a particularly important aspect of a reward system. Inadequate salaries have been found in some studies to be the single most important cause of resignations from LDC research institutions. Monetary rewards are not the main motivator for highly productive scientists, but scientists are more likely to quit when their pay is not commensurate with their level of achievement (e.g., Pelz and Andrews 1966: 110-111).

"Relative salary" was measured by rating the salaries of researchers in a particular institution relative to the salaries of comparable professionals in the same country. Survey respondents were asked to rate the relative salaries of researchers in increments of 10 percent, ranging from "Researchers earn about 40 percent less than comparable professionals," to "Researchers earn about 40 percent more than comparable professionals."

As shown in Figure 1(a), responses from both DC's and LDC's ranged from -40 to +20 percent. In general, the pattern of responses is similar in DC's and LDC's. The Chi square test is unable to distinguish between the two distributions. But a higher percentage of LDC institutions was found at the extreme low end of the scale. About 16 percent of LDC respondents reported the salaries of their scientists as 40 percent below that of comparable professionals in the same country, compared to only about 2 percent of DC respondents. In these low-end institutions, salaries are clearly inadequate and are likely to be a source of institutional instability and high researcher turnover.

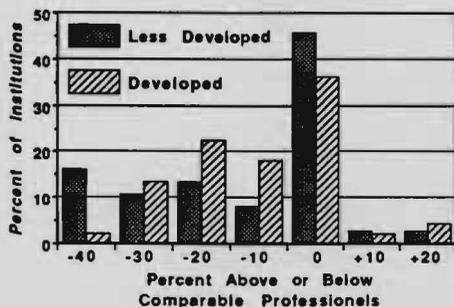


Figure 1(a). Salary of forestry scientists relative to comparable professionals in the same country in institutions from less developed countries (Less Developed) and developed countries (Developed).

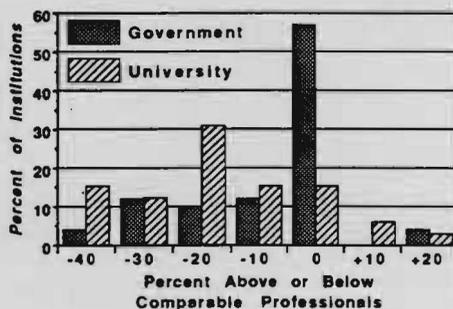


Figure 1(b). Salary of forestry scientists relative to comparable professionals in the same country in government research institutes (Government) and university departments (University).

More striking than the difference between DC's and LDC's was the contrast between government forestry research institutions and university forestry departments with respect to this indicator (Figure 1b). This difference was highly significant statistically, using the Chi square test. The modal value for salaries in universities was 20 percent below that of comparable professionals in the same country, compared to a modal value of 0 in government institutions

(scientists earning about the same as comparable professionals). Lower university salaries are offset at least in part by greater opportunities for university scientists to augment their salaries through consulting activities.

2. Other Extrinsic Rewards

In addition to direct salary, a variety of other extrinsic rewards and incentives for scientists may be important. Six categories of rewards are considered here:

- financial awards for outstanding productivity, quality, etc.,
- nonfinancial awards and recognition,
- additional research funding,
- other benefits such as housing or transportation,
- international travel, and
- career advancement in research.

Rewards such as these are likely to be important in encouraging scientists to work for the goals of their research organization. For example, award programs may be set up to recognize outstanding contributions to technology transfer, interdisciplinary research, or other organizational goals. Souder has shown that there is no one ideal type of award program: "Each program must be carefully tailored to the needs and the culture of the host organization," (1985: 18). This is especially important in international comparisons of research award programs, where cultural and other differences may be marked. The prospect of additional research funding may also induce scientists to work in areas of high priority to the organization. Housing, transportation, and other benefits may be essential incentives for researchers in remote locations in LDC's. International travel and career advancement in research may give scientists fame within the scientific community mentioned by Samuelson.

Survey respondents were asked to rate the frequency of use of the above six items in their research organization (1 = never, 2 = occasional, 3 = frequent, 4 = always), and their perception of the effectiveness of each reward in stimulating researcher productivity (1 = none, 2 = slight, 3 = moderate, 4 = great). The mean frequency of use of these six rewards in LDC institutions was "occasional," although averaging the responses obviously hides the variability between institutions (Fig. 2). A statistically significant difference was found between DC's and LDC's in their ratings of frequency of use for two of the six rewards (only the LDC ratings are shown in Figure 2). "Other Benefits" were used significantly more in LDC institutions. This may be due to the use of housing, transportation, and other special benefits to induce scientists to work in remote locations. In contrast, "career advancement in research" was used significantly more in DC institutions. This may indicate lack of a career ladder in research in some LDC institutions. In extreme cases, assignment of personnel to a public research institute with no possibility of career advancement has been used as punishment for poor performance elsewhere in government service (cf., Mathu 1983).

The perceived effectiveness of each reward in stimulating researcher productivity does not closely match frequency of use (Fig. 2). For example, "nonfinancial awards" were used most frequently on average, but were perceived to be least effective, relative to the other five rewards. "Financial awards" were used least often, but received a high rating of perceived effectiveness.

A composite index was constructed to provide an overall indicator of the adequacy of the incentive environment relative to these extrinsic rewards (the composite index of extrinsic rewards is used in the incentive profiles in the following section). For each institution, the frequency of use of each reward was weighted by the rating of perceived effectiveness. The six components were then summed to form a composite index — a single number that summarizes this aspect of

the health of the incentive environment for each institution. A wide dispersion of this index around the modal index value was found. The distribution was quite similar between DC and LDC institutions, except that about three times more LDC institutions were found at the bottom of the distribution than DC institutions.

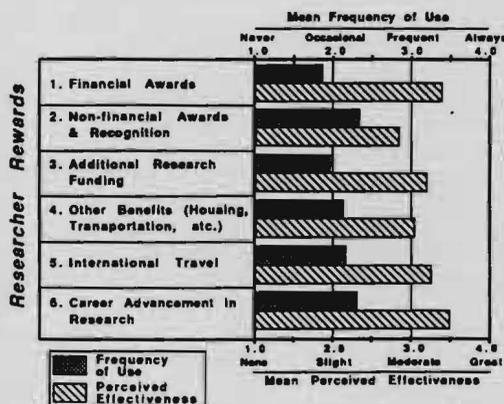


Figure 2. Mean frequency of use and perceived effectiveness in stimulating researcher productivity of six rewards for researchers in developing countries.

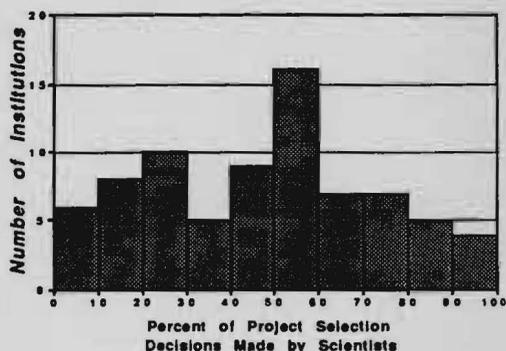


Figure 3. Distribution of the mean percent of project selection decisions made by forestry researchers in less developed and developed countries.

3. Decision Making Power of Scientists

A third indicator of the research incentive environment is a measure of the amount of freedom that scientists have in their research. Scientific freedom is clearly an intrinsic reward, and it is an important one for most scientists. Being independent and curious by nature, scientists naturally prefer to have as much autonomy as possible in their work. There may be a tradeoff, however, between scientific freedom and the ability of administrators to direct scientists toward work that will accomplish organizational objectives. Pelz and Andrews (1966) examined the tradeoff between "freedom and coordination" in research and found that "some combination of both is not only feasible, but helpful for the scientist himself, that is, when he involves several other people in shaping his assignments, but keeps substantial influence over the decision process" (p.32). A scientist's performance tended to be higher when various people were involved to some extent in decision making. Pelz and Andrews also found that performance was low where the chief alone determined the scientist's assignments.

The percent of project selection decisions made by scientists was used as a proxy for research freedom. Survey respondents were asked to estimate the percent of project selection decisions made by scientists in their organization, by administrators in their organization, and by administrators in other organizations. Figure 3 shows the distribution of this indicator for DC's and LDC's. The influence of scientists on project selection decisions differs greatly among institutions. There is some degree of central tendency around the modal value of 50 to 60 percent. Institutions falling on the low end of this scale are likely to have some difficulties with motivation because scientists in them lack decision making power, and those at the extreme high end may have problems coordinating or directing their research programs. No statistically significant differences were found between DC and LDC institutions. As might be expected, some evidence was found of greater decision making power of scientists in universities than in government research institutes, although this relationship was not very strong.

4. Technical Support

A fourth indicator of the incentive environment is the adequacy of technical support for scientists. The extent to which scientists are adequately supported by technicians and other support personnel is associated with a scientist's ability to achieve the intrinsic rewards of a scientific career. The analogy has been drawn between the importance of technical support personnel to scientists and ancillary medical professionals to a medical doctor: "A highly trained agricultural scientist with hardly any competent backstopping is comparable to a doctor with no nurses, laboratory staff, or paramedics," (Oram 1978: 8). Scientists without adequate technical support will be frustrated and severely handicapped in carrying out a program of research, in using their specialized knowledge and skills, and so on. Without adequate support, scientists will spend too much time on unrewarding busy-work. Inadequate provision of research support personnel has often been observed in LDC's (cf., Jones 1971, Radhakrishna 1979, Odera 1983, Kim 1984).

The adequacy of technical support for researchers was measured simply as the ratio of technicians to scientists in an institution. This is obviously an imperfect measure of technical support. Some fields of research require more field and lab assistants than others, and this measure glosses over these differences. But the overall number of technicians per scientist does provide a measure of the relative adequacy of technical support in an entire institution, and should separate out institutions with glaring deficiencies in this area.

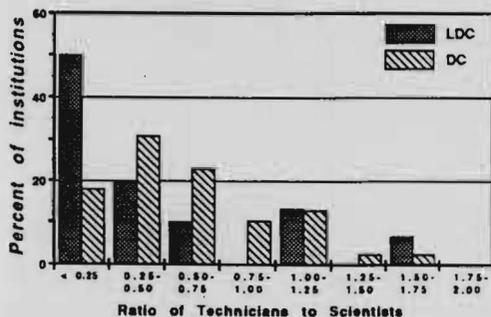


Figure 4. Ratio of technicians to scientists in forestry research institutions in less developed and developed countries.

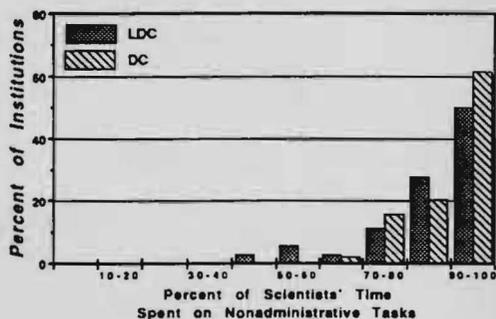


Figure 5. Percent of scientists' time spent on nonadministrative tasks in forestry research institutions in less developed and developed countries.

As shown in Figure 4, the distribution of this indicator is skewed to the right (the right-hand tail of the distribution is stretched out). A higher percentage of LDC institutions is found at the extreme low end of the scale, although the statistical evidence is not conclusive on this difference. Fifty percent of the LDC institutions sampled have less than one technician for every four scientists, compared to less than 17 percent of the DC institutions. Much more striking, however, is the strong statistically significant difference between government institutes and universities in technical support — 60 percent of universities sampled have less than one technician for every four scientists, compared to about 10 percent of government institutions.

5. Bureaucratization

If research freedom is an important aspect of the incentive environment for scientists, then a related factor may be freedom from an excessive administrative burden that diverts scientists from research activities. Noble laureate T.W. Schultz has commented that "Organization is

necessary... But there is the ever present danger of over-organization... of requiring working scientists to devote ever more time to preparing reports to 'justify' the work they are doing, and to treat research as if it were some routine activity befitting a high-class clerk." (Schultz 1978: 102). Unfortunately, many research institutions are organized so that scientists must spend much of their time and energy on administrative tasks that keep them away from their research. An excessive administrative burden on researchers in developing countries has often been observed (cf., Dessau 1969, Iyamabo 1975, Menon 1980, Brunig 1982). In a review of agricultural research systems in Asia, Ruttan states: "I am concerned about excessive administrative burden that stifles both routine investigation and research entrepreneurship" (1981: 12).

The degree of "bureaucratization" in a research institution was measured as the percent of time that researchers spend on nonadministrative tasks, so that low values of this indicator relate to a heavy administrative load on researchers. Survey respondents were asked to indicate the approximate percent of time that researchers in their organization allocate to:

- research,
- technology transfer,
- teaching, and
- various administrative tasks.

As shown in Figure 5, the distribution of this indicator is skewed to the left for both DC and LDC institutions (the left-hand tail is elongated). In general, 50 to 60 percent of DC and LDC respondents reported that 90 percent or more of their researchers' time was devoted to nonadministrative duties. However, a few LDC institutions report that about half of their researchers' time is spent on administrative tasks, a heavy load that could be a strong disincentive for scientists. The hypothesis of no difference in this indicator between DC and LDC institutions would be rejected at a significance level of .09 using the Chi-square test, so there is some evidence of greater administrative burden in developing countries. Government research institutions reported a significantly heavier administrative load on scientists than universities, as might be expected.

INCENTIVE PROFILES

To be useful in efforts to strengthen research institutions, the set of incentive indicators must be presented in a way that facilitates evaluation and comparison between institutions and within an institution. A convenient way of summarizing the information about all five indicators is to con-

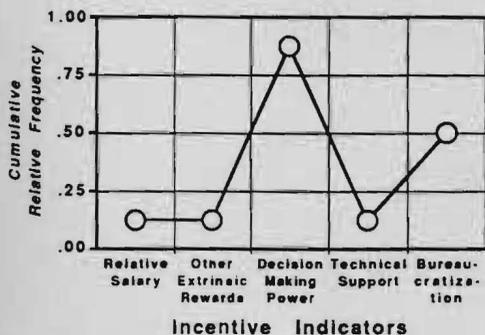


Figure 6(a). Researcher incentive profile for a university forestry department in an African country

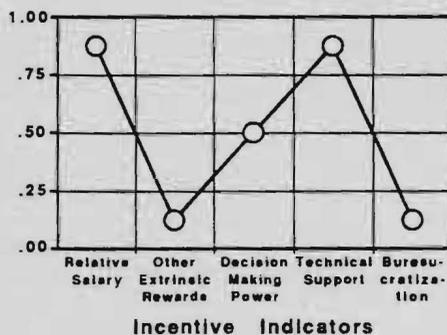


Figure 6(a). Researcher incentive profile for a government forestry research institution in a Latin American country.

struct a profile for individual research institutions. Figures 6(a) and 6(b) show how an institution ranks relative to all other institutions in the sample with respect to the five indicators. These profiles divide the distribution for each indicator into quartiles, so that the dividing points are the first quartile, the median, and the third quartile. For a finer breakdown, distributions could be broken into deciles or percentiles. The research institution represented in Figure 6(a) — a university forestry department in an African country — has a fairly typical incentive profile for a university. The institution ranks in the bottom quarter of all LDC institutions sampled in terms of the "relative salary" of scientists and "other extrinsic rewards." It ranks in the top quarter in "decision making power" of scientists, but in the bottom quarter in the ratio of technicians to scientists, both characteristic of universities. Finally, it is right on the median in terms of "bureaucratization" or administrative burden. The potential value of an incentive profile is its ability to highlight the strengths and weaknesses of an institution relative to other institutions. Figure 6(a) shows the potential bottlenecks of "relative salary," "other extrinsic rewards," and "technical support," to focus on in efforts to strengthen the incentive environment of this particular institution.

The institutional profile in Figure 6(b) was chosen to illustrate that profiles may be unique. This profile represents the incentive environment in a government forestry research institution in a Latin American country, and it is fairly typical of government research institutions. "Relative salary" of scientists falls in the upper quarter of the sample, but "other extrinsic rewards" ranks very low. This indicates an opportunity for improving extrinsic rewards. "Decision making power" of scientists falls in the middle of the distribution and, typical of government institutions, "technical support" ranks high. The level of "bureaucratization" falls in the lower quarter of the distribution, indicating a high level of administrative burden on scientists. This last indicator and "other extrinsic rewards" are two areas that would warrant further investigation in this institution.

CONCLUDING REMARKS

Future research on incentive systems should include several refinements. First, a more comprehensive set of indicators would be valuable, especially with respect to the nonsalary extrinsic rewards and incentives. These may be key to creating a productive research environment and motivating scientists to work for the goals of the organization. Second, developing multiple indicators of each aspect of the incentive environment would also be useful to test the validity of the incentive indicators. The validity of an indicator is the extent to which it measures what it is intended to measure. With only a single indicator for each characteristic, validity may be suspect. If we can make a reasonable and convincing argument that each of several indicators produces a valid measure of the characteristic in question and there is agreement between the multiple indicators, then the claim of validity is greatly strengthened.

Finally, research examining the link between the use of various incentives and rewards and the actual productivity of a research organization or the retention of scientists would be extremely useful. The approach for evaluating researcher incentive systems outlined in this paper measures the strengths and weaknesses of an institution's incentive system relative to norms established by other forestry research institutions, rather than measuring the actual effectiveness of various incentives and rewards. These norms will represent a meaningful evaluation yardstick only if a wide range of incentive systems — from outstanding to lackluster — is represented in the sample. The wide range of responses for each of the five indicators tends to confirm what others have observed about the range of institutional capacities in forestry research: "Some countries can tap into high-quality research institutions while others have very limited local institutional capacities," (USAID 1984, p. 26). Forestry research in four Asian LDC's ranges from "exemplary to moribund" according to Callaham and Buckman (1982, p. v. See also: FAO 1978, Menon 1980). Comparisons between a sufficient number of research institutions are therefore likely to

define a meaningful evaluation yardstick capable of distinguishing high and low quality researcher incentive systems.

The incentive indicators and profiles discussed in this paper can help research administrators and others readily single out, study, and correct potential bottlenecks in an institution to strengthen its research capacity. Comparison of the two illustrative profiles in Figures 6(a) and 6(b) suggests that institutions may have a unique mix of strengths and weaknesses in the area of researcher incentives. Cost-effective strategies for strengthening incentive systems and research capacity in LDC's would involve targeting high priority areas and removing these bottlenecks. The importance of strong researcher incentive systems is indicated by the fact that the ideas, talents, and skills of scientists are a research institution's most valuable resource and its most expensive investment. Creating a work environment that nurtures the creativity and productivity of scientists is perhaps the most important function of research management.

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WORKING PAPER No. 15

**HUMAN RESOURCE MANAGEMENT
FOR
AGRICULTURAL RESEARCH:
OVERVIEW AND ISSUES**

**PAUL BENNELL
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September 1988

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International Service for National Agricultural Research

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HUMAN RESOURCE MANAGEMENT

for

AGRICULTURAL RESEARCH:

OVERVIEW AND ISSUES

INTRODUCTION

People are the most important resource for national agricultural research. The human resources of a research organization are the primary means by which it achieves its objectives. Productive agricultural research systems, therefore, require effective planning for and management of professional researchers and their support personnel. The objective of this document is to assist agricultural research program managers and administrators at all levels in developing the knowledge and skills needed to maximize the effective productivity of these specialized human resources.

The policies and practices required for managing human resources of agricultural research institutions differ in important respects from those for many other types of public and private-sector institutions. Most notably, agricultural research is highly skill intensive, requiring the recruitment of specialists and the provision of continuous professional development. Agricultural researchers are engaged in a complex array of activities with generally unpredictable outcomes. This, plus the fact that several disciplines and sub-disciplines are involved, complicates the planning for and management of human resources and the development of an effective information system.

Agricultural researchers themselves have unique occupational needs and characteristics which have important implications for management. As potentially creative individuals, it is asserted that they have especially high expectations for job fulfillment and need considerable autonomy in deciding on and carrying out their research activities. An important responsibility of agricultural research managers, therefore, is to insure that the organization retains and effectively utilizes human resources with the specific skills, attitudes, and motivations which will allow the organizational objectives to be attained as efficiently as possible.

This document provides an overview and identifies some important issues relating to human resources management for agricultural research. Most of the material in the document is equally applicable to individual research institutions and well-coordinated national agricultural research systems (NARS).

There are two sections in this document. Section I focuses specifically on five human resource management tasks for agricultural research which can be defined as follows:

1. Planning involves the determination of types, amounts, and availability of human resource skills required for the attainment of predetermined program objectives and tasks over a specified time period in the most cost-effective manner.
2. Staffing involves the development of job descriptions and the policies and practices that relate to recruitment, selection, assimilation, and deployment of personnel.
3. Development involves the continuous improvement of the capacities of research personnel through formal education, specialized and on-the-job training, and participation in professional meetings.
4. Compensation relates to the structure of grades, promotion policies, and salary and non-salary rewards which influence the motivation and performance of researchers and support staff.
5. Evaluation includes performance planning, appraisal, and counseling which are critical to the effective management of human resources.

Section II focuses on organizational behavior factors relating to researcher motivation and interpersonal and intergroup behavior. The latter includes such management issues as leadership, team building, effective communication, and conflict management.

Appendices provide practical guidelines and sample documents for NARS managers and personnel directors. Other ISNAR documents provide NARS managers and administrators with an understanding of the rationale for and utilization of information for human resource management, including a human resource information system (HRIS).

SECTION I - HUMAN RESOURCE MANAGEMENT TASKS

Human resources can be described as a sub-system within a larger organizational system. The human resource system within a national agricultural research institution or system includes the quantity and quality of its research staff and the organizational framework governing its behavior.

This section reviews the tasks required to plan and manage a human resource system for agricultural research. Figure 1 illustrates the planning and management process for a human resource system. It shows an iterative process that begins with three inputs: research objectives, available operating resources, and the current state of human resources. The manager first measures the available human resources against research objectives. Then, decisions are made in the planning stage to modify the human resources, within the available operating resources, so that the research objectives can be met. Management decisions are made and then implemented in the areas of staffing, development, compensation, and evaluation. At the end of the management cycle, the human resource system reflects the changes that have resulted from management decisions. The modified stock of human resources becomes an input into the next planning cycle.

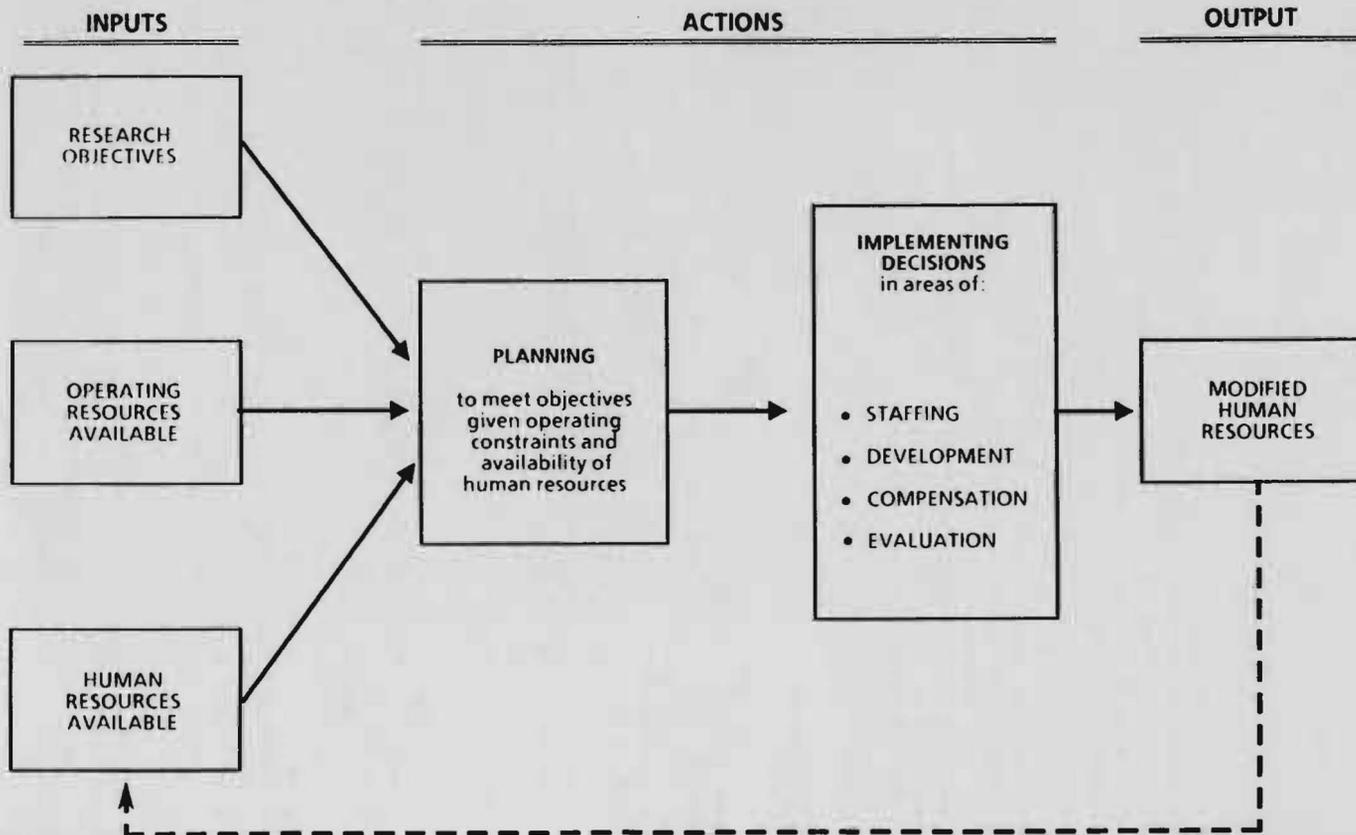
1. PLANNING

Human resource planning involves the analysis and determination of the types, amounts, and availability of personnel required for the efficient and effective attainment of organizational and program objectives. This activity allows research managers to assess where their organizations are and should be going in terms of human resource availability and utilization. The main products of this planning activity are realistic strategic and operational plans. The longer-term strategic plan may include, for example, the strengthening of the training capacity of the institution or proposed changes in personnel policies to appropriately reward research staff. The operational plan may include changes in personnel recruitment levels, redeployment of staff, or implementing a performance planning and appraisal system.

Human resource planning has not been a rigorous activity of many NARS, particularly those that are young and experiencing rapid growth in a relatively short period of time. Several factors which contribute to the lack of comprehensive human resources planning are: (1) a low level of overall program planning for the NARS, (2) lack of control over personnel recruitment, (3) excessive program and personnel fragmentation due to the nature of the system or to heavy reliance on donor projects, (4) rigid civil service regulations which reduce options for personnel deployment and rewards, (5) limited human resource planning expertise, (6) an inadequate human resource information system, and (7) a heavy reliance on donor funding for staff development.

Human resource planning is integral to the overall program planning process. The primary reference points for human resource planning and utilization are organizational goals and objectives and research program plans and priorities. It is essential, therefore, for research managers to be able to relate information about current and future staff to current and future

Figure 1: The Human Resource Management Process



commodity, regional, and/or discipline-oriented research programs. This link between human resource planning and program planning provides the basis for an effective and comprehensive research program that relates resources to national agricultural development goals.

It is important at early stages of the human resource planning process to make current and future assessments of the capacity of the research organization to effectively absorb, utilize, and manage projected levels of staff. The following are some of the factors that affect the utilization and, therefore, productivity of agricultural researchers. These factors will likely modify the projections of requirements discussed above.

- Training capacity within, or readily available to, the organization for researchers who must be trained on the job by experienced and competent researchers.
- Opportunities for university training for young, qualified staff on whom the organization depends for future program leadership. Of particular importance is the continued development and availability of basic research skills in addition to disciplinary expertise.
- Management capacity for staff direction, supervision, and monitoring. This includes management at the station, division/department, and program levels.
- Support assistance from technical and other support personnel. The number and quality of these personnel influence the number of researchers who can be employed effectively. While the needs vary considerably for different disciplines, a common overall relationship for many NARS is two technicians and three-four support persons for each researcher.
- Funds for operational expenditures is a major determinant of the numbers and kinds of researchers who can be employed effectively. Funds for operations and support personnel represent the total recurrent resources available per researcher. It is often said in developed countries that no more than 70 percent of recurrent research expenses should be for personnel. However, in developing countries where salaries are low relative to those in developed countries, but many operating expenses are priced on an international basis (e.g., imported fertilizers), such a ratio may be misleading. Under these circumstances, it would be more appropriate to establish a minimum average budget per researcher.
- Adequate facilities for agricultural research endeavors which require specialized laboratories or other facilities. Coordination of staff recruitment and facilities development is essential.

Assessment of these factors and their relevance to human resource requirements is crucial both for effective planning for the future and for understanding current management problems. Planned expansion of the level of staffing of a NARS may need to be deferred until these factors become adequate to permit the effective utilization of staff.

The human resource planning process includes three interrelated activities:

- analysis of human resources requirements (demand);
- assessment of the availability of human resources (supply);
- matching requirements to availability.

How these planning activities contribute to the development of a human resource strategy for a NARS is described below. This planning process can be facilitated by an effective human resource information system (HRIS) which is discussed in other ISNAR documents.

Analysis of Human Resource Requirements

Determining human resource requirements constitutes the "demand" side of human resource planning. Ideally, human resource requirement estimates are derived on the basis of carefully formulated national research strategies and program objectives. Effective human resource planning, therefore, is fully dependent upon the planning and programming of agricultural research activities. In other words, research managers can utilize a planning process to determine personnel needs only if they first know what they want to accomplish.

The research program should normally constitute the basic unit of research planning at all levels (institution, department, and project). Research managers, in conjunction with planners and budget authorities, determine the optimal allocation of all resources among the various possible agricultural research programs. Full consideration needs to be given to overall national and agricultural development objectives and the likely level of resources available in the future. When this is accomplished, more detailed planning is undertaken in order to allocate these resources to activities within research programs. This phase of operational planning is known as programming.

For human resources, the research planner first determines the optimal skill and discipline composition of each agricultural research program/project over a specified time period. This activity, called task analysis, also includes the determination of support personnel requirements and substitution possibilities for different sets of tasks. A considerable amount of experience and informed judgement on the part of research managers is required for task analysis.

Tasks to be performed are defined by the research program. Tasks are aggregated into jobs with job classifications and descriptions. Job descriptions may be similar for several positions (one for each staff member) in the organization. The organizational structure gives definition to the positions in relation to each other and to career possibilities in the institution.

As a research institution grows and develops, it becomes more important to analyze and define tasks which need to be performed by the four types of personnel: researchers, administrators and managers, technical support staff, and non-technical support staff. Task and job analysis allows the institution to (1) periodically review and re-define positions in relation to program objectives, (2) develop job classification systems, (3) establish specific recruitment targets, (4) establish appropriate schemes of service, and (5) evaluate performance against established criteria. See Appendix 1 for details on the content of a job analysis.

The core personnel of a NARS are its professional researchers. A basic measure of the current and potential future research capability of a NARS, therefore, is the level of education and training of its researchers. Preliminary data from 79 developing countries included in the ISNAR Agricultural Research Indicator Series Database show that an average of 12 percent of NARS researchers have a Ph.D. degree, 35 percent an M.Sc. degree,

and 53 percent a B.S. degree (or their respective equivalents). Given the fact that postgraduate degrees train agriculturalists in research methods, higher percentages of M.Sc. and Ph.D. staff would be necessary to effectively strengthen most NARS.

Technical support personnel in agricultural research organizations are composed of distinct groups: field technicians, laboratory technicians, station/farm managers, and support services (statisticians, information officers, librarians, computer specialists, etc.). Among them, they are responsible for carrying out the bulk of the activities undertaken by agricultural research organizations. It is important, therefore, to analyze tasks, provide appropriate career structures, and set performance standards for each of the separate types of technical support personnel. This process facilitates the determination of appropriate levels of technical support personnel required for researchers in various disciplines and at various levels in the system.

An emerging and important group of research staff are those who are involved in the technology transfer process. These may include on-farm research technicians, subject-matter specialists, and research-extension liaison staff. In many cases, these staff are affiliated with extension institutions. However, NARS are increasingly recognizing the value of such staff, and new positions are being defined within NARS to facilitate the technology transfer process. The numbers, placement, and position classifications of such staff are important issues for consideration by planners who are determining the future manpower requirements of a NARS.

Once these factors and considerations have been taken into account, it is then possible to derive approximate net human resource requirements by category of research personnel, location, discipline, and program area. Before defining the manpower plan, however, it is necessary to review the availability (supply) of research personnel and then match human resource requirements to availability (discussed in the next two sections). The final stage of the process involves a determination of absorptive capacity of the institution or system.

Availability Assessment of Human Resources

In addition to determining human resource requirements and organizational absorptive capacity, the human resource planning process also entails an assessment of the types and range of skills that are currently available and are likely to be available in the future. This constitutes the "supply" side of human resource planning.

A quantitative and qualitative inventory of currently available agricultural research personnel in the NARS is the point of departure for assessing the availability of human resources. This inventory provides information about the characteristics of the current staff of the research organization for (1) qualifications, including highest degree obtained, special training undertaken, and professional work experience; (2) allocation of staff in terms of crop, research program, discipline, function, and position; and (3) location of staff in terms of research center, on-farm/on-station, and region of the country.

An analysis of the human resources inventory, particularly over time, (1) permits the diagnosis of the manpower strengths and weaknesses of the research organization, (2) assists in the process of projecting availability in the future and (3) provides a basis for staff development planning with educational institutions and donors. Other ISNAR publications on information systems provide details about data requirements, analysis, and presentation for a human resource inventory.

Some NARS regularly experience high vacancy rates, particularly for researcher positions. While this may reflect the lack of availability of qualified persons to fill approved positions or rapid turnover of staff, it may also be related to the lack of allocated funds for these positions. In any case, it is important to assess the reasons behind each vacancy as part of the process of determining availability of staff for future appointments.

The future availability to a NARS of researcher and management skills depends on three primary factors:

1. Upgrading and redeployment of existing personnel. In most cases, existing research personnel comprise the bulk of human resources that will be available in the future. The previously referenced inventory of all personnel employed by the agricultural research system provide basic data. Detailed information on staff training and on current and previous work experience and activities is particularly useful here. Personnel policies which involve performance planning and assessment, reward merit, and promote internal mobility and training serve to facilitate the process of upgrading and redeployment to meet program needs.
2. Recruitment of new personnel. Researchers come not only from educational institutions, but also from the relevant national and international labor markets. Of particular importance is an assessment of the quantity and quality of all levels of trained agriculturists coming out of national technical schools, colleges, and universities currently and projected into the future. A thorough review would include an assessment of demand from competing employers. Another recruitment factor to assess is the general mobility of professionals within a country, considering political and cultural factors and civil service regulations.
3. Attrition of personnel. Attrition may come from retirements, deaths, resignations, and dismissals. Attrition levels plus estimated net growth of research personnel determine recruitment levels. The main component of attrition in many young NARS is voluntary resignations which reflect both the conditions of service within the research organization and external labor markets. In general, current trends in and levels of annual rates of attrition among different types of research personnel constitute the starting point for estimating probable rates of attrition in the future. To the extent that conditions of service are perceived to have improved relative to other potential employers, for example, future attrition rates would be expected to drop. As conditions change in related labor markets, attrition rates may be affected positively or negatively.

High levels of demand for individuals with practical field and laboratory skills can make attrition of high-quality technical support staff high. Since research activities depend heavily on these personnel, analysis of recruitment, utilization, and attrition among these categories of personnel is important.

Matching Requirements to Availability

The final stage of the human resource planning process involves matching the estimates of skill requirements with probable skill availabilities from both internal and external sources. The planning process ultimately yields detailed information on the desired number of staff by skill level (experience) and specialization. Comparison of the desired staff with the existing staff determines the net addition to personnel. The net addition, combined with estimates of attrition, determines desired recruitment levels. The lower the estimated net growth, the more directly recruitment will correspond to attrition (i.e., replacement only). Conversely, the lower the attrition rate, the more directly recruitment will correspond to net growth. Where NARS are experiencing periods of consolidation rather than continued rapid growth, policies designed to reduce attrition will also reduce recruitment requirements.

In some exceptional cases, all proposed skill requirements can be satisfied; but, more typically, there will be shortfalls in selected categories of staff and disciplines. In some instances, these can be overcome by a reallocation of staff or changes in staff assignments in specific subject areas and/or recruitment of foreign research personnel. It is then possible to specify target projections for net additions and (using estimates of future attrition) for gross recruitment to each category of personnel and area of research specialization (discipline) for the duration of the planning period.

2. STAFFING

The planning activities described above result in overall estimates of numbers of staff required and likely to be available for the research program as projected to some future period. Through the process of staffing, the research manager builds upon the information generated in the planning process about specific tasks to be performed and the specific positions required. The research manager then seeks to operationalize plans by defining in detail job descriptions and specific recruitment targets for various categories of staff. The recruitment process includes the attraction, selection, and assimilation of new staff into the institution. A final staffing concern for research managers is the placement or deployment of staff within the organization in relation to location, linkages with other staff, and program priorities. This section focuses on these three elements of staffing.

Defining Positions

Full job descriptions identify the job in the organization, describe its purpose and activities, specify responsibilities and performance standards in detail, and list minimum and desirable qualifications for the job. The job description of an agricultural researcher would normally emphasize the following aspects of job performance (adapted from Arnon)¹):

- initiative in recognizing new research opportunities and in proposing and preparing research projects;
- responsiveness to problems suggested by program leaders, extension workers, and farmers:

- cooperation in research teams where researcher competence is needed;
- supervision of other research staff and support staff;
- training of research and support personnel;
- familiarity with professional literature and interest in broader scientific subjects;
- planning, designing, and conducting experiments, including the collection of background information;
- analysis of results and determination of significance and conclusions;
- presentation of research results in a timely fashion in the form of a report or paper for publication;
- communication of the results to other scientists, extension workers, and farmers by the most appropriate media.

Job descriptions and classification systems (titles and grades) should be different for and responsive to the needs of administrators, researchers, technical staff, and support staff. For example, career ladders, incentive systems and task expectations are much different, and this needs to be clearly reflected in the job descriptions. Researcher classification systems normally provide for continued opportunities for advancement and recognize education, experience, and performance. Job descriptions are relatively flexible to allow for the creativity and initiative expected of professional researchers.

Recruiting Staff

The recruitment process depends upon the development of job descriptions, assurances of position approvals, and financial support from the appropriate authorities (often outside the research institution). The process is likely to be influenced or entirely controlled by central government regulations. In some cases, governments have recognized the special nature of research and provided separate conditions and recruitment regulations for scientists. In other cases, it is possible to obtain exemptions from normal regulations in order to facilitate the hiring of appropriate staff.

Ideally, a research organization should be in a position to control the number and types of personnel who are recruited. The recruitment process, then, is an outcome of the planning process which involves the matching of carefully formulated research programs with available and required numbers of qualified researchers and support staff. A rational recruitment plan must be related to the organization's capacity to provide effective training and supervision of new staff.

An initial step in the process of recruitment is the attraction of high-quality researchers who provide creativity, intellectual rigor, and long-term commitment for agricultural research. The ability to attract well-qualified staff is influenced by their availability within the country, competition in the labor market, and the conditions of service within the institution. This may require the development by the research institution of specific strategies, policies, and procedures to promote recruitment according to the staffing plan. For example, it is often possible to develop close

working relationships with the staffs of universities and training institutions. These relationships may include scholarships for promising students, collaborative research projects involving faculty and their postgraduate students, and work-study schemes. Also, it is possible to consider recruitment of staff from basic science and social science backgrounds for selective positions in the institution.

Experience and research have shown that it is possible to develop a profile of a productive researcher. Characteristics include: (1) highly qualified for the job, (2) highly motivated to performance, (3) positive orientation to job, (4) demonstrated maturity, and (5) effective interaction with others (adapted from Ranftl, pages 93-96)²). Many of these characteristics are intrinsic to the individual and best handled in the recruitment process. Others are subject to improvement through management decisions and policies. Management interventions such as training can be utilized for improving the productivity of those identified as having high potential for creativity, originality, initiative, and technique. This profile approach to recruitment implies that quality input has a high degree of predictive value in determining quality and valuable output.

The selection of candidates may be based on a variety of instruments and techniques which collectively provide a sufficiently accurate indication of the likely job performance of each individual candidate. Objective information will come from academic records, civil service examinations, and specialist examinations administered by the agricultural research institution. Subjective information will come from references, interviews, and the descriptive materials and publications submitted by the candidates. The involvement and comments of research personnel possessing the necessary technical competence will improve the selection process. Future evaluations of actual job performance can be used to assess effectiveness of prior staff selection procedures.

The assimilation or induction of recruited staff into the research institution is an important and often neglected part of staffing. The productivity and efficiency of staff is improved at a faster pace if the institution recognizes the need of new staff for information about (1) specific and detailed job expectations, (2) criteria and procedures for performance evaluation, (3) purpose and program of the unit in which placed, (4) the culture and doctrine of the institution, and (5) relationships and linkages with other relevant organizations (like extension). Deployment of new staff in teams with mature researchers can facilitate the process of assimilation into the institution.

Deploying Staff

The manner in which researchers and technical staff are deployed (placed) both within the organization and at what physical location will influence the productivity of a NARS. Many of the basic decisions about deployment are made during the planning process. The topic is treated here since managers implement plans and are often in the position of making the final decisions on deployment at any point in time.

The need to develop and maintain "critical masses" of researchers in terms of specialization, program size, and geographic location is of critical importance. This will permit effective inter- and intra-disciplinary interaction among the professional research staff. With increasing

decentralization of some research systems, staff interactions and collaboration associated with "critical mass" become increasingly important. Strategies for deploying on-farm research teams is of particular concern to many NARS.

It is essential that young researchers are deployed in such a manner that they receive close supervision. When there is a shortage of appropriately skilled and experienced researchers to perform this role, trainee researchers may need to be deployed in groups for more formalized in-service training. Supervisors and experienced staff may need to be trained to facilitate the early development of new staff.

Research staff must be carefully deployed in relation to research program objectives. This means that data on numbers and disciplines of full-time-equivalent staff be maintained by priority programs, whether defined by commodity, region, or other program-related focus. If research priorities define select target client groups, it is important to deploy staff accordingly. The mix of disciplines of researchers will be determined over time by the specific problems encountered and the ability to "borrow" technology.

Depending on the structure and organization of the NARS, it may be necessary for research managers to facilitate the interaction and cooperation of researchers between national bureaucracies, autonomous institutions, and universities. This is possible if the institutions involved have identified and articulated their respective roles and, therefore, the responsibilities of their staff. Where institutions have specific responsibilities for functions in an agricultural technology development system, it is particularly important that they be able to develop effective and legitimized modes of collaboration and cooperation. Linkage/interface mechanisms between organizations may be vital to staff performance in meeting program objectives.

Issues of deployment relating to personal satisfaction and special compensation of staff posted in remote locations are handled in the section on compensation.

3. DEVELOPMENT

To become and remain productive, an agricultural researcher requires both formal and on-the-job training. Agricultural research activities are, by their very nature, highly skill intensive, and many of these skills are initially acquired by formal academic training. However, if agricultural research personnel are to maintain up-to-date knowledge and skills in their area of specialization and, thereby, be able to continue to undertake high-quality research throughout their careers, training must be received on a periodic basis.

This apprentice-to-professional researcher development activity is characterized by rather specific training needs at various stages of a researcher's career. Three modes of training for agricultural researchers can be identified: (1) apprenticeship, (2) formal degree training, and (3) professional development.

Apprenticeship

As an apprentice, a new agricultural researcher ideally would receive structured, intensive on-the-job training under the specialized supervision of an experienced researcher. The purpose of this apprenticeship period is to acquire and adapt relevant skills and knowledge to the program needs of the institution and, equally important, to encourage the formation of appropriate attitudes and commitments for a productive career in agricultural research.

During the apprenticeship period, it is normal for the new researcher to attend short, intensive training courses to improve knowledge and skills. Since many NARS are small in size, these courses will often need to be organized on a regional basis involving both national and international research institutions. The apprenticeship period may last from two to three years, after which the trainee acquires professional status as an agricultural researcher. In some cases, however, formal degree training early in the researcher's career is considered to be a part of apprenticeship training.

Formal Postgraduate Training

It is essential for NARS to have a substantial core of staff with postgraduate degree training involving research. If not acquired before entry into the agricultural research institution, opportunities for postgraduate studies may be made available to young researchers early in their careers, but after a period of apprenticeship. While postgraduate degree training is essential for most trainee agricultural researchers, it is not a substitute for on-the-job training. For example, the necessary skills and attitudes needed for collaboration with farmers are acquired primarily by working intensively with farmers themselves. On-the-job training prior to postgraduate study is preferred, since it helps provide a relevant context for specialization in the degree program.

Postgraduate degree training within the country is preferable in fields where standards are adequate, since the relevance of the training is potentially high. In many cases, NARS have developed strong relationships with universities to influence the content of this training and to collaborate in the research required for the degree. In a few countries, NARS have initiated and established their own postgraduate degree programs, often with at least the nominal participation of a university.

As a consequence of the limited postgraduate training capacity in the main agricultural science disciplines in many countries, however, large numbers of agricultural researchers with postgraduate degree training have attended overseas universities. In planning for staff to enroll for postgraduate degrees abroad, it is important that NARS managers to be aware of and deal with several critical issues:

- Relevance. Postgraduate programs in developed countries may lack sufficient relevance for students who wish to work in tropical environments. Similarly, research theses and dissertations may be based on topics that are of little direct or indirect value to research priority areas of the NARS.

- Specialization. A sound scientific education is necessary to prepare researchers to face future problems. However, staff with narrow specializations may not be suitable for research programs in the many situations where broader-based knowledge is required. This, then, can eventually reduce the capacity of the organization to understand and deal with priority agricultural problems. A high degree of specialization involving sophisticated equipment and large teams of support personnel may be inappropriate to country research needs and may be difficult to support over time.
- Diversification. To prevent "inbreeding" of human resources and widen the base of methodology in a NARS, it is important to utilize several educational institutions for degree study. This point was made by one NARS manager as follows: "Ideally, students should be sent to as many countries and universities as possible so that in the end a weakness from one institution will be complemented by a strength from another."
- Selection and sequencing. Projects, seniority, and other factors often influence the timing and selection process. However, research managers need to view degree training and develop training plans in the context of overall organizational development and program goals. Persons selected for overseas degree training opportunities would normally be those with excellent qualifications, commitment, and promising careers in agricultural research (merit based). Ideally, researchers would begin advanced degree training after an apprenticeship period, but before mid-career.
- Duration and cost. Agricultural researchers have typically had to spend relatively long periods overseas in order to obtain their postgraduate degrees (a minimum of two years at the master's level and another two-four years at the doctoral level). The duration is even greater when instruction has been in a foreign language or when students have had to repeat courses as remedial or preparatory training. The cost of overseas postgraduate training is also an increasingly important issue. In recent years, total annual costs have been in excess of US\$ 20,000 at most universities in Europe and North America.
- Re-entry. The process of re-entry and adjustment to culture, environment, family, and job is often underestimated. NARS managers need to recognize this process and develop reorientation activities to facilitate the reassimilation of trained staff into the institution. On this point, a NARS manager says, "The issue of re-entry after a period of study overseas is never taken seriously; and yet, it is important because it could lead to wasting of resources when officers conduct research of little practical importance."

Recognition of these problems with overseas postgraduate training has led to improvements and alternatives in recent years. Some research institutions have developed "special relationships" with one or more overseas universities involving links with teaching and research personnel and, thereby, providing the basis for more effective and relevant training. Provisions have been made by donors, universities, and research institutions for some degree candidates to return to their national research organizations in order to collect data for dissertations and theses on priority research topics. Another approach is where the student completes some of the required coursework at an overseas university and the remainder, including the dissertation or thesis, at a local

or regional university. In the longer term, this strengthens regional and national postgraduate training capacity while at the same time it responds to issues of cost, relevance, and over-specialization.

Professional Development

Appropriate training opportunities throughout the agricultural researcher's career are necessary not only for maintenance of technical and scientific competence, but also to sustain motivation and productivity. Through these opportunities, agricultural researchers (especially those who work in small groups and are geographically isolated) are able to maintain essential contact with other researchers and with the international scientific community in general. The need for specially arranged contacts with other researchers becomes increasingly important as the researcher gains in experience and maturity.

This in-career training may take a variety of forms, ranging from more formal and structured events (such as national and international short courses, conferences, seminars, workshops, and professional meetings) to more informal activities (such as study tours, special assignments, and contact visits to other research institutions). Each has its strengths and weaknesses, depending on the objectives and needs of the professional. It is important that research managers meet with researchers periodically to assess needs and plan or identify in-career, professional activities to meet these needs utilizing the most effective forms of training possible. Ideally, planning for professional development is part of an overall NARS planning process and occurs during the performance planning and appraisal process (see section 5).

The two most important decision criteria for researcher involvement in professional development activities are the priority goals and objectives of the research program area and the specific needs of the researcher in responding to these priorities over time. Practical considerations in the decision include the availability of financial support (particularly for international activities), the ability to launch appropriate training activities within the country (relevant where needs are specific and highly technical), and overall staff workloads. With the increased availability of international short courses and donor support for international training in some countries, research managers need to develop the capacity for careful planning and evaluate the utility of these opportunities to their institution. This will avoid distortions in staff development caused by well-intentioned, but uncoordinated outside influences.

Researchers with current or planned substantive management responsibilities should receive both general and specialized management training in order to develop appropriate skills and commitments. Agricultural research is relatively management intensive with typically 10-15 percent of researchers having significant management responsibility. Research managers are often young, with limited research experience. Also, they tend to be the most talented researchers who, in the absence of a "dual-track" career structure, are forced upwards into management positions. As a consequence, many are ambivalent and unsure about their roles as managers. Few NARS managers have received any formal training in either management or agricultural research management. Hence, well-designed and carefully targeted management training programs will help considerably in creating a more competent, professional cadre of agricultural research managers.

4. COMPENSATION

Compensation schemes (also referred to as conditions of service) relate to the structure of grades and positions, promotion policies, and salary and non-salary rewards. The retention, motivation, and performance of well-trained agricultural research staff depend critically on compensation policies and procedures. While agricultural research managers are not always in a position to make effective changes in policies and procedures for compensation of research staff, several options for improvement may be within the legal and policy framework of NARS.

A number of common problems can be identified in relation to grading, promotion, and reward structures for agricultural researchers. These problems stem from the fact that most agricultural researchers are subject to the same terms and conditions of employment that apply to all other professionals employed in the civil service. Public-sector compensation policies and practices are of central importance to all governments, both economically and politically. Civil service and finance units are often reluctant to make even minor changes unless there are compelling arguments for treating agricultural researchers differently from other groups.

For many NARS, strategies for improving productivity may not be successful unless there is significant improvement in compensation for researchers and key categories of support personnel. Salaries and other benefits need to be competitive with other professionals in the public sector as well as (ideally) with those in the private sector. This is not only true for apprentices in the early stages of their careers, but also for experienced research personnel.

Most civil service systems have promotion policies that favor seniority over merit. The absence of regular, objective assessments of on-the-job performance in determining financial rewards has been a major factor in stifling motivation. In many cases, this results in continued high rates of attrition of young promising staff and seriously impedes efforts to build up cadres of experienced and productive researchers and technicians. The value of investments in human resource planning and training is considerably reduced under these circumstances.

Studies of NARS have shown that there often is only a relatively small income differential between starting salaries and the highest attainable salary levels (usually the latter is less than 2.5 times the former). Often there are only a limited number of major promotion opportunities during the career of a researcher, and existing promotions are generally not associated with significant increases in income. In some organizations, researchers reach the highest attainable grade and salary level relatively early in their careers and have limited prospects for further advancement unless they become managers.

Guidelines

In order to provide attractive career opportunities for agricultural researchers, a well-designed grade, promotion, and payment system would have the following characteristics:

- Compensation policies are simple in concept and design. It is important that policies be easily understood by all employees and be implemented by management in a straightforward manner.
- Grades and salaries are based on (1) detailed job analysis and evaluations to determine the "size of the job" according to skill, knowledge, and responsibility requirements; and (2) national salary and compensation surveys of similar jobs and occupations (where compensation includes other than direct salary, it is important to evaluate the magnitude of these non-salary benefits for comparative purposes).
- Job titles allow both colleagues and outsiders to readily identify the seniority, position and, hopefully, competence of the individual. More importantly, they help the researcher to have a clear sense of career progression. Appendix 2 provides a sample grading scheme showing titles and responsibilities over a career of an agricultural researcher.
- Promotion and financial incentives are provided throughout the entire career of a researcher. This implies the existence of regular opportunities for promotion and significant percentage increases in compensation.
- Promotion criteria and requirements are well specified and place primary emphasis on demonstrated job performance. Where appropriate, adequate recognition is given to the attainment of job-relevant qualifications. Seniority criteria generally play a limited role, and promotions do not depend on the availability of vacancies in any grade category or job level.
- Accelerated advancement possibilities are provided for specially competent and highly motivated researchers who have made exceptionally valuable contributions to research programs. Without this flexibility, it is likely that such "star performers", who normally play such important roles in scientific research, will leave to take up more attractive employment opportunities elsewhere.
- The income growth curve corresponds to the underlying relationship between the experience of researchers and the level and rate of growth of individual productivity. Normally, this curve will rise relatively slowly at the outset of the research career, more rapidly once the professional apprenticeship period is completed, and more slowly again during the latter career stages. Appendix 3 provides sample grades and salary indexes which utilize this principle.
- Dual career ladders are designed to provide able scientists who wish to remain in mainstream research with the opportunity to attain the status and salary levels of senior management.
- Teaching and consultancy assignments are encouraged for mature scientists within a policy framework specifying amount of time and the relationship to normal responsibilities. However, employees are not, as a rule, permitted to engage in regular (part-time) income-earning activities outside of their normal employment. Such activities often give rise to conflicts of interest and tend to adversely affect the amount of time and commitment researchers devote to their work.

Implementation Possibilities

Since civil service systems can impose constraints on the development of desirable compensation schemes for agricultural researchers, NARS may consider the following alternative possibilities to improve the situation:

- Organizational autonomy. In a few cases, NARS or parts of NARS have been able to establish sufficient autonomy to devise their own personnel policies, including compensation schemes. In recent years, some have become semiautonomous foundations.
- Researcher classification system. In several countries, a special classification and compensation scheme has been established for all scientists, built around several of the above guidelines. This enables researchers to remain in regular government agencies while recognizing the factors which are needed to retain and motivate them for agricultural research. The results of salary surveys of other professional and technical groups in public and private sectors is then used to present the case for across-the-board increases in salaries and benefits for researchers and support personnel.
- Selective policy changes. Another approach is to focus on making selective changes to existing grading, promotion, and salary policies, some of which would have only limited cost implications. This approach may include: improvements in evaluation procedures, extended salary scales, dual-track career structures for researchers and research managers, improved salary and non-salary allowances and fringe benefits, awards for exceptional performance, and a modified grading structure.

Non-salary Benefits

In addition to salaries, NARS provide research staff with many other payments and non-monetary benefits. Payments are often made for per diem allowances, transportation, housing, education of children, etc. Also, government policies often directly provide health benefits, retirement (pension) plans, and life insurance. While these policies may be established for all civil service personnel, their application is often conditioned by the circumstances of the NARS and donor-funded projects. In some cases, NARS have been able to obtain exceptions to civil service policies to respond to their unique circumstances.

The very nature of much of agricultural research requires residence in rural areas, often in relatively remote locations. This poses a serious problem for research managers in their attempts to provide incentives to motivate researchers who may, by virtue of education and acquired status, prefer to live in or near a metropolitan area. To address this problem, it may be necessary to provide adequate housing, transportation, medical facilities, and schooling for children, as well as recreational opportunities. Given the prospective difficulties in making available some of the amenities cited above (e.g., medical care and schooling), it may be necessary to reward those scientists working in remote locations with disproportionately greater training and promotion opportunities. Further, it may be necessary to implement a long-term staff rotation scheme, both to insure adequate staffing for remote field stations and to ensure that experience at such stations is part of the career development of each researcher. Care should be taken to minimize problems of program discontinuity in any rotation scheme.

Where salaries and normal benefits are not sufficient to attract and retain high-quality researchers, special forms of compensation are often devised or applied. These range from liberal interpretations of per diem policies to the provision of honoraria for involvement in research projects. These payments may be necessary and are useful where the civil service system emphasizes seniority instead of merit and as a selective means of encouraging and rewarding productivity. Under some circumstances, these payments have the potential for abuse and may encourage the proliferation of marginal, low-quality research activities. It is important that such policies be managed carefully and reviewed often for impact on the quality of the research output.

Another mechanism, which would both motivate staff and improve the quality of performance, is the introduction of a system of limited supplements, bonuses, or special awards based on exceptional performance alone. The system would need to include specific performance criteria which would not discriminate against staff in any discipline or function.

5. EVALUATION

Effective human resource management requires periodic staff evaluation. This is normally accomplished through the establishment of an appropriately designed performance planning and appraisal system. In practice, evaluating the performance of technical and other support staff has been more common and acceptable than evaluations of researchers and administrators. There is a natural reluctance on the part of researchers to allow administrators or peers (particularly those from other disciplines) to pass judgement on qualitative or quantitative aspects of their work. Despite this, there is growing acceptance of the need for an effective performance planning and appraisal system for agricultural researchers. As one NARS manager declares, "Absence of regular assessment of on-the-job performance in determining financial rewards has stifled motivation alright, but the result has been not so much high rates of attrition of staff (usually there is no alternative employer), but a general malaise or apathy."

Measures of Performance

Quantitative measures of performance for agricultural researchers are difficult to establish and maintain. This is due to the range of activity from basic to applied to adaptive research as well as to the characteristics of output from the various disciplines. This is further complicated by the fact that actual performance of a researcher may be influenced as much by resource and facilities availability and reward and promotion systems as by the individual's ability and output.

The most common measure of performance of researchers is publications in professional journals where, in some cases, the more senior the staff, the more publications are required. However, this may not be entirely appropriate for those involved in important adaptive research activities. In the extreme, excessive reliance on "scientific" publications may effectively direct research output away from meeting critical needs of farmers the system is

designed to serve. Other quantitative measures of performance may include reports issued, recommendations made and accepted by client groups, and number of projects in which the researcher is engaged. All fall short of providing meaningful and appropriate measures of researcher performance.

Because agricultural research is relatively non-repetitive, requires creativity, and has unpredictable outcomes, the evaluation of researcher productivity is better suited to qualitative assessment. The beginning point for this is the program plan and the corresponding plan of work for the researcher. It is important that personal goals be compatible with organizational goals. Once this is established, it is possible to define tasks and to establish a reasonable time frame for their completion. At the time of annual performance reviews, research managers can review output with respect to time involved, relation to task requirements, use of effective research techniques, problems/errors, impact, etc. Over time, NARS managers can establish and communicate a set of expectations for researchers that will be understood throughout the organization.

Performance Planning and Appraisal

Performance planning for the researcher is analogous at the individual level to the organization's macro-level program planning activities. Similarly, performance appraisal is a component of program monitoring and evaluation.

The process of performance planning involves: (1) a prior and periodic elaboration of individual goals to be achieved in relation to program goals and (2) the establishment of criteria by which specific aspects of researcher goal achievement can be measured.

Performance appraisal involves a periodic and mutual assessment of actual performance in relation to desired (planned) performance. It offers the opportunity to review researcher, management, and organizational factors which may influence staff performance.

Well-designed personnel performance planning and appraisal systems serve the needs of both the organization and individual employee. From a management perspective, a personnel appraisal system provides essential information for planning the future use of human resources. The system forms the basis for informed decisions about future training activities and about the allocation of financial and other rewards to employees. With regard to the individual employee, a well-designed and implemented personnel appraisal system is of decisive importance in maintaining and improving motivation. It provides regular feedback information on job performance, indicates how performance might be improved in the future, and generally creates a favorable environment in which individuals are able to discuss their personal growth and development in the organization. A sample form for performance appraisal is shown in Appendix 4.

The following are characteristics of effective performance planning and appraisal systems:

- Specific and accurate. Effective performance planning and appraisal systems are based on clearly specified and measurable performance standards and indicators. Only those activities that are important for successful job performance are taken into account. Other characteristics, most notably the personality traits of the individual that are irrelevant to job performance, are excluded from consideration. Similarly, only the actual work done is to be evaluated, not the potential for work yet to be done. The starting point of the process is mutual agreement by management and the employee on the employee's job description and on performance goals to be achieved. The different aspects of job performance are clearly delineated, separately assessed, and then combined using a common weighting system.
- Reliable and consistent. Once appraisal techniques and methods are determined, effective appraisals produce consistent measurements of performance both among individuals and over time. Appraisals typically rely on both objective and subjective performance ratings. The need for reliability and consistency becomes greater as dependence on subjective estimates of performance is increased.
- Practical and simple. It is important that the appraisals be kept as simple and practical as possible, with a minimum of paperwork. Personnel appraisal systems can quickly become overly elaborate and complicated. When this happens, both management and employees face considerable difficulties in understanding the concepts and procedures involved, and the whole process becomes time consuming and prone to breakdowns.
- Regular and routine. Personnel appraisals, undertaken on a regularly scheduled basis, usually satisfy both management and individual needs. In practice, effective communication is unlikely to be maintained unless formal appraisals are completed at least once a year. For effective management, informal day-to-day contacts and interactions are also used for feedback on progress of staff towards individual and program goals.
- Participatory and open. Effective personnel planning and appraisal systems are based on a high level of direct participation by employees in the appraisal process. This normally takes the form of appraisal interviews with superiors who have the best direct knowledge of the employee's past performance. Past performance is discussed in a frank and open manner, and goals for future work, as well as strategies for performance improvement, are established. Such a system is dependent upon a high level of acceptance by employees. There are some situations where comments from the individual's own colleagues and indirect feedback from client groups can be helpful in the appraisal process.
- Integrated with rewards. Personnel performance planning and appraisal systems are most effective when job performance is closely linked to individual rewards. Without such an association the appraisal process becomes of marginal value and importance to both management and employees.

- Relevant and responsive. Performance planning, appraisal, and rewards for the individual must be directly related to program plans and objectives of the NARS. For example, if program goals require more client orientation, individual plans and evaluation criteria need to be responsive in terms of research activities, procedures, and locations. In such a case, the performance plans and the reward structure would encourage publications for extension workers, and personnel policies would provide sufficient incentives for living and working in remote locations.

High levels of responsibility and commitment throughout the management hierarchy are necessary for personnel planning and appraisal systems to be effective. In practice, many managers are reluctant to be critical of colleagues as subordinates in a merit-based system. Consequently, there are often strong tendencies toward excessive leniency in rating employees and/or excessive bunching of evaluation ratings within a narrow range of values.

Managers can be taught to evaluate personnel performance. Critical skills include the ability to (1) be an "active listener", (2) empathize and communicate effectively with subordinates, (3) be supportive rather than excessively critical, and (4) develop short- and long-term plans for individual improvement. In general, appraisal systems are most effective where managers have a basic understanding of researcher motivation and the socio-psychological aspects of job behavior and performance.

An effective performance planning and appraisal system requires a capacity for employee counseling. Continuous interaction between the researcher and program managers will facilitate performance consistent with program goals and norms within the institution. Where there are difficulties in reconciling program and individual goals and problems arise between researchers, counseling by someone other than a supervisor may be required. NARS are well served to identify a senior person who can serve to resolve conflicts and assist staff in achieving job satisfaction.

SECTION II - ORGANIZATIONAL BEHAVIOR FACTORS

A primary task of research managers at all levels is to create the appropriate policy, technical, and social environment within their organization that facilitates the effective and efficient performance of research personnel within a NARS. Performance is normally viewed as effective if it corresponds to and achieves organizational objectives and efficient if it achieves the highest research output possible from the combination of resources and knowledge at its disposal. An understanding of the social structure of the research system and the values of researchers is basic to the task of improving personnel and organizational performance.

As stated in the section on evaluation, the performance of agricultural research personnel is sometimes difficult to define and certainly difficult to measure. Managers who understand the factors which motivate their research personnel to improve their performance will be in a good position to influence and improve the overall productivity of the organization. Management for research and development activities requires a balance between flexibility to encourage creativity and direction to ensure that organizational and program goals and objectives are served.

Researcher performance can be improved by the effective execution of the five management tasks described in the previous section. There are, in addition, several organizational behavior factors which influence researcher performance and for which research managers can develop and improve their capabilities to handle. The first is to understand researcher motivation. The second is to manage interpersonal and group behavior through effective leadership, team building, improved communication, and conflict management.

1. RESEARCHER MOTIVATION

What motivates agricultural researchers varies from culture to culture and organization to organization. There are, however, some concepts which are useful for review and evaluation by all NARS managers, since they are common across cultures and organizations. Many of these concepts are embodied in the Maslow theory of human needs and the Herzberg theory on motivation. Maslow's theory states that individuals will behave in such a manner as to meet a hierarchy of needs from the basic to the more complex. According to the theory, the order of human needs is as follows: physiological (survival), security (safety), belongingness, self-esteem, and self-actualization.

Herzberg's theory looks at motivation from the standpoint of job context (environmental factors) which may cause dissatisfaction and job content which relates to satisfaction of research personnel. The former, called hygiene factors, includes: company policy and administration, supervision, working conditions, interpersonal relationships, money, status, job security, and effects of the job on a researcher's personal life. The latter, called motivators, includes: achievement, recognition, work itself, responsibility, advancement, and professional growth. Within a NARS, it is important for managers to evaluate the importance of these satisfiers and dissatisfiers in order to improve performance of human resources.

Based on past and current research, there are several important motivation requirements which influence the behavior and performance of agricultural research personnel. These may be placed in the following categories for consideration and appropriate action by NARS managers: personal, administrative, professional, and organizational. Each of these motivation requirements or factors can be assessed for both importance and adequacy within the research organization.

- Personal. Personal motivation factors for agricultural researchers combine the human needs defined by Maslow as physiological (survival) and security (safety), and the environmental factors discussed by Herzberg. For the most part, personal factors are considered to be dissatisfiers or demotivators. In other words, if they are not adequate, they have a very negative impact on performance. Included are:

- * job security
- * sufficient financial support for self and family
- * equitable financial and status rewards
- * suitable living conditions.

- Administrative. The motivation factors considered to be administrative relate to the support required to successfully and satisfactorily complete a research activity. These may be considered to be maintenance factors in that they are neither strong dissatisfiers or satisfiers. Included in this category are:

- * operating supplies and services
- * equipment and tools
- * transportation
- * experimental land
- * amount and quality of technical staff
- * amount and quality of labor
- * scientific literature/library
- * advice from experimental researchers.

- Professional. The professional motivation factors for agricultural researchers are a combination of Maslow's self-actualization needs and Herzberg's motivators. These factors are viewed as satisfiers or positive motivators for agricultural researchers. Included are the following:

- * freedom to choose research problems on which to work
- * opportunity for professional advancement
- * promotion based on merit
- * scientific recognition
- * opportunity for advanced education
- * contact with other scientists
- * freedom to publish research results
- * utilization of research results
- * opportunity to train subordinates.

- Organizational. In addition to personal, administrative, and professional motivation factors, scientists have expectations of the organization and management which influence their performance and behavior. These are also motivation factors and may include:

- * scientifically trained management
- * management with a reputation for scientific achievement
- * organization with a reputation for scientific achievement.

How agricultural researchers perceive the relative importance of various motivational factors is critical to their performance. It is possible for NARS managers to assess both the importance and adequacy of motivational factors within their organization through surveys, staff consultations, and performance appraisals. ISNAR is currently initiating research to explore this important management area in more depth.

2. INTERPERSONAL AND GROUP BEHAVIOR

The relationships among agricultural researchers, individually and in groups, require careful management for effective individual and organizational performance. Inter- and intra-departmental cooperation is required to handle the breadth of disciplines for even a single research problem as well as for engaging the various support services and managing the diverse functions of the research process. To influence interpersonal and group behavior, managers need to understand leadership, team building, improved communications, and conflict management.

Leadership

Agricultural research organizations require a style of leadership and management which will allow a diverse group of highly trained and potentially creative individuals to work individually and together to achieve organizational goals and objectives. The style of leadership of a NARS and its various administrative and program units is dependent on factors relating to the manager (personality, confidence, values, motivations), the researchers (motivation factors, education, experience, commitment, understanding of organization goals) and the organization itself (mandate, resources, responsiveness, place in society). Many of these factors can be addressed by NARS managers to improve researcher and, therefore, organizational performance.

Few agricultural research managers have received training in management. In many cases, they are in their positions by virtue of their excellent research and, therefore, have the full respect of their colleagues. This is an important and necessary requisite for effective research management, but management skills are also required. Management training is available for both functional and process-oriented skill development. One of the most important of the process-oriented skills is the ability to manage/lead in an atmosphere which places high values on collegiality and creativity. Such leadership requires a balance between highly directive, authoritative approaches and entirely non-directive, "hands-off" approaches. While different situations may, in fact, require different approaches on the part of research managers, a participatory approach, with a concern for both the researcher and the task to be performed, has been found to be most effective.

Research managers can learn much about their own leadership styles and the perceptions of others about these styles through self-assessment exercises now available in agricultural research training programs.

Team Building

The building and management of team-oriented activities to meet program objectives has always been an important activity of agricultural research managers. In recent years, however, NARS have given greater attention to client-oriented, farming systems, and problem-oriented research. This has focused the attention of research managers on the need to build effective, multidisciplinary teams of researchers in projects involving multiple locations. In some cases, these teams have included professionals from other agencies, such as extension, and primary client groups like farmers.

The performance of researchers as a team requires careful and effective management. This includes a clear specification of tasks required for each team member, a common understanding of the objectives of the activity, a legitimization of the activity, and a reward system which encourages teamwork. The ability to manage interpersonal conflict and develop group cohesiveness is essential to achieving an effective level of performance from researchers in team activities.

Communication

Many NARS now have communication units which perform a variety of communication tasks, including the transfer of research results to client groups and funding agencies, public relations, and internal communications. The performance of researchers is dependent on a flow of information from external knowledge sources (including client groups), between and among discipline groups, and between them and managers and support personnel.

Communication within a NARS can be difficult due to the high degree of specialization of researchers, the value placed on individual thought and creativity, and a degree of autonomy often granted to units in the research organization. While it is obvious that communication cannot be left to chance, excessive communication can be time consuming and expensive. Managers can encourage informal communication through such mechanisms as periodic social events, sports activities, dining and recreation rooms, and professionally oriented field trips. Formal communication can occur through regular staff meetings with agendas, research teams, limited committee activities, publications (newsletters, annual reports, and circulated research reports), and periodic research reviews.

The development of interpersonal communication skills is essential for NARS managers to obtain the optimal performance of agricultural researchers. Training programs exist to facilitate the development and utilization of these skills.

Conflict Management

Agricultural research organizations are not immune to conflict. In fact, the diffusion of authority, the diverse character of its staff, and the nature of the research process itself all contribute to the potential for serious conflict within a research organization. Achieving good performance from research personnel requires (1) the acceptance of conflict as inevitable within an organization, (2) a good understanding of types of conflict situations, and (3) the management skills to respond appropriately.

The experience of a NARS manager in Africa leads him to conclude: "Some research managers find it very uncomfortable to deal with conflicts. In such situations, there is little or no teamwork and a minimum of communication of staff at all levels. There is also a tendency for backbiting and berating of other researchers, especially the weak ones. If the conflict situation goes on for too long, the whole institution falls into disarray, and the removal of the institute head is inevitable."

A modest amount of conflict can be healthy and functional for a research organization, since it may offer opportunities for exploring new concepts and for dealing with underlying factors contributing to poor performance. If conflict is viewed as inevitable rather than avoidable, it can be used as a catalyst for positive change in the organization. Conversely, if conflict is suppressed, it can lead to negative behavior on the part of research staff and can reduce the opportunities for creative responses.

There are several types of situations where personnel conflict can occur. The first type is where the objectives of the researcher and the organization do not coincide. The second type is where there are challenges of authority at any level. The third type relates to the problems between classifications of personnel, e.g., researchers and technical support staff. The fourth type is where horizontally related groups such as departments have problems due to task or resource interdependence. A fifth type is where research personnel have problems with external groups such as clients and political groups. And, finally, there may be conflicts that are related to differences in personalities.

In dealing with conflict, managers need to define the problem carefully before deciding on an appropriate strategy for a response. Four types of conflict management strategies have been identified (Arnold and Feldman, page 225)³): avoidance, defusion, containment, and confrontation. An example of an avoidance strategy is ignoring the problem when it appears to be a trivial issue. Imposing a solution when decisive action appears to be warranted may also be an avoidance strategy. Smoothing over a tough situation before it becomes more difficult is an example of a defusion strategy. An example of a containment strategy is where a manager bargains with the conflicting parties, given the fact that several acceptable solutions may be available. One might employ a confrontation strategy by redesigning the organization to improve the coordination of research efforts. While none of these strategies is necessarily wrong, it is possible to employ the wrong strategy for the conflict at hand.

Experience and judgement are important in conflict management. Through effective leadership and good communication with research staff, NARS managers can utilize conflictual situations to the advantage of the organization. Creating a dynamic and open climate for researchers will help reduce the potential negative aspects of conflict situations. In dealing with conflict, the importance of understanding the factors which motivate research staff in a NARS cannot be understated.

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APPENDIX 1

Major Components of a Complete Job Analysis for Agricultural Research Staff

1. Job title, work location and salary range.
2. Experience, training, and education requirements.
3. Training required after employee is hired.
4. Previous jobs in the organization likely to qualify employees for this job.
5. Future jobs for which employee may qualify by successful performance.
6. Analytical, technical, and behavioral skill requirements.
 - * kinds of equipment to be operated: e.g., computer
 - * interpersonal skills: e.g., communicating with farmers
 - * technical knowledge: e.g., genetics for plant breeding
 - * technical skills: e.g., statistical analysis
 - * physical skills: e.g., walking 5 kilometers per day
7. Performance standards for each type of skill, including frequency of use and level of expertise required.
8. Working conditions relating to travel, stress, safety, etc.
9. Role relations: who evaluates? who supervises? who provides information, supplies, and other services? who receives information and reports on work?
10. Decision-making authority: time span, magnitude, and review procedures.

Source: Adapted from U.S. Training and Employment Service, Handbook for Analyzing Jobs, U.S. Government Printing Office, Washington, D.C., 1972.

APPENDIX 2

Sample Grading Scheme for Agricultural Researchers

<u>Professional Grade</u>	<u>Requirements</u>
Assistant Researcher	Recognized first-degree professional qualification. High potential to undertake research with appropriate attitudes and intellectual competence.
Researcher I	Successful completion of 4-5-year professional apprenticeship as assistant researcher involving structured on-the-job training and supervision, and completion of master's level postgraduate degree training.
Researcher II	Normally a minimum of five years service as Research I. Demonstrated ability to undertake, with appropriate supervision, good-quality and relevant agricultural research.
Senior Researcher	Normally a minimum of five years service as Researcher II. Consistent performance as a mature, productive researcher able to train and supervise junior colleagues. Acquisition of relevant Ph.D. degree training would normally assure promotion to this grade.
Principal Researcher	Normally a minimum of five years service as a Senior Researcher. Recognized specialist with record of extensive original research with a national and international reputation. Above-average performance.
Chief Researcher	Normally a minimum of five years service as a Principal Researcher. Exceptional qualities as a researcher with outstanding publications record and clear evidence of research impact on agricultural productivity.

APPENDIX 3

Sample Grades and Salary Indexes
for
Agricultural Researchers

Years Service	Grade	Index	Annual Increase
1	Assistant researcher	199	-
2		103	3.0
3		106	3.0
4		109	3.0
5		112	3.0
6	Researcher I	123	10.0
7		128	4.0
8		133	4.0
9		139	4.0
10		144	4.0
11	Researcher II	158	10.0
12		168	6.0
13		178	6.0
14		189	6.0
15		200	6.0
16	Senior Researcher	220	10.0
17		229	4.0
18		238	4.0
19		247	4.0
20		257	4.0
21	Principal Researcher	283	5.0
22		290	2.5
23		297	2.5
24		305	2.5
25		312	2.5
26	Chief Researcher	321	3.0
27		326	1.5
28		331	1.5
29		335	1.5
30		341	1.5

AGRICULTURAL RESEARCH
PERFORMANCE REVIEW FORMS*

NAME

DEPARTMENT/STATION

A. REPORT ON QUALITIES AND PERFORMANCE

(i) SCIENTIFIC and RESEARCH

1. SCIENTIFIC INTEGRITY

- Outstanding for integrity in his research 1
- Maintains a high standard of honesty in research 2
- Generally reliable scientifically 3
- His scientific integrity leaves something to be desired 4
- Unreliable scientifically 5

2. ORIGINALITY AND INITIATIVE

- Always full of good research ideas 1
- Usually makes a valuable contribution 2
- His solutions are usually adequate 3
- Seldom takes constructive action 4
- Fails to respond to a new situation 5

3. SCIENTIFIC KNOWLEDGE AND ATTAINMENT

- Exceptionally wide, thorough and up-to-date 1
- Considerable breadth or depth of knowledge 2
- Sound within his field 3
- Narrow or out-of-date 4
- Inadequate 5

4. OUTPUT

- Outstanding in the amount of work he does 1
- Gets through a great deal of work 2
- Output satisfactory 3
- Does rather less than expected 4
- Output regularly insufficient 5

THE RESEARCHER

5. INTERPRETATION OF DATA

- Exceptionally good use of data and results 1
- No difficulty in reaching good conclusions 2
- Uses data satisfactorily 3
- Not good at interpreting results 4
- Fails to use data effectively 5

6. PUBLICATIONS

- Outstanding in prompt and excellent publication of work 1
- Maintains a high standard of publication 2
- Publications of good quality 3
- Written work not just good enough to get by 4
- Inaccurate and slow in publications 5

(ii) PERSONAL

7. PERSONAL RELATIONS

- Retains highest regard and respect of all 1
- Is generally well regarded and respected 2
- Gets on reasonably well with others 3
- Not very easy in his relationships 4
- Very difficult person 5

8. RESPONSIBILITY AND RELIABILITY

- Accepts responsibility at all times; distinguished for reliability 1
- Very willing to accept responsibility; highly reliable 2
- Accepts responsibility as it comes; generally sound 3
- Inclined to refer matters he could decide; not too reliable 4
- Avoids taking responsibility; unreliable or careless 5

9. QUALITY OF ORAL EXPRESSION

- Exceptionally affective 1
- Clear and convincing 2
- Expresses himself adequately 3
- Not an effective speaker 4
- Cannot express himself clearly 5

10. JUDGMENT AND DISCRETION

- Displays exceptional wisdom, foresight and discretion 1
- Always sensible and discreet 2
- Handles most situations adequately 3
- Tends to be erratic in judgment or indiscreet 4
- Judgment faulty 5

* By courtesy of Dr. Walsh, Director, The Agricultural Institute, Eire.

(iii) ADMINISTRATIVE

C. OVERALL ASSESSMENT OF FUTURE POTENTIAL

11. LEADERSHIP

- A natural leader: always inspires subordinates 1
- Inspires others and manages staff very well 2
- Exercises adequate control 3
- Does not enthuse subordinates or control them well 4
- A follower 5

- Likely to stand out in the higher grade 1
- Well fitted for immediate promotion 2
- Now ready for promotion 3
- Likely to qualify for promotion in time 4
- Unlikely to qualify for higher grade 5

12. ORGANISING ABILITY

- A brilliant organiser 1
- Very effective in organising work 2
- Plans and directs work satisfactorily 3
- An indifferent organiser 4
- Has no organising ability 5

D. REPORTING OFFICER'S OTHER OBSERVATIONS AND CERTIFICATE

Note any comments not already covered.
In my opinion, the ratings of the Officer are as stated.

Signature..... Date.....

13. ABILITY TO DEAL WITH FINANCES AND FACILITIES

- Distinguished for responsibility in handling resources 1
- Manages finances and facilities very well 2
- Adequate in resource use 3
- Indifferent in dealing with money and facilities 4
- Poor at dealing with them 5

E. COUNTERSIGNING OFFICER'S OTHER OBSERVATIONS AND CERTIFICATE

Note any general comments. If you disagree with any rating by the reporting officer, please indicate which you consider correct by a cross x in the appropriate box and initial the entry.

In my opinion the ratings are correct, subject to any amending entries or remarks which I have made and initialled.

..... Date.....

(iv) CONDUCT and PUNCTUALITY

Satisfactory
If not, explain under "Other Observations".

B. OVERALL ASSESSMENT OF PERFORMANCE IN PRESENT POST

- Outstanding in all respects 1
- Very able and effective 2
- Competent 3
- Not fully up to standard 4
- Unsatisfactory 5

ANNEX

ANNEX

An Agricultural Research Management Perspective on Human Resource Information Systems

Larry Zuidema

Introduction

This paper is designed to be complementary to the ISNAR working paper Human Resource Management for Agricultural Research: Overview and Issues. The purpose is to provide managers of agricultural research institutions and systems with an understanding of how information about and related to human resources can be made useful and accessible for planning and implementing agricultural research programs.

Organized, accessible information about and related to human resources can be a major contributor to management decisions. An effective information system describes the state of human resources in the research system and what changes take place over time. The manager uses human resource information together with the accumulated knowledge and wisdom, the perceptions and opinions of staff, the reactions of clientele, and organizational policies to make effective management decisions.

A distinction is made in this annex between information about human resources and other information related to human resources. Information about human resources describes their characteristics and utilization in the research system. This can be organized as a component of a management information system (MIS) and is often referred to as a human resource information system (HRIS). Information related to human resources describes the internal and external environments within which researchers function and about which policies and procedures can be made. An example of this related information is a list of training opportunities for research staff.

This annex focuses on the development and use of an HRIS for program management, i.e., for analytical rather than purely administrative purposes. Other organized information related to human resources which can be effectively utilized along with an HRIS is also identified and briefly described. The topics of this document are: the rationale for an HRIS, organization of information, outputs, sources of information, managing information, computers and software, information for human resource management (HRM) tasks, and a summary.

1. Rationale

Many NARS have grown rapidly in the past decade in both size and scope of activity. In such a situation, it is essential that the structures and tools utilized for human resource management be adequate for the tasks which the contemporary manager must perform. One very useful tool for agricultural research managers is an organized information system.

The effective management of human resources for agricultural research requires the continuous availability of relevant information in a usable form and a process for data analysis. An information system can be designed to provide managers with a comprehensive understanding of the current situation relating to research personnel as well as to make projections into the future. Such a system will contribute substantially to the research manager's ability to deal with each of the five areas delineated in the overview and issues paper: planning, staffing, development, compensation, and evaluation of human resources.

The basic rationale for an HRIS and the maintenance of related information for human resource management is to improve the decision-making capability of research managers to serve the goals, objectives, and program plans of the NARS. An HRIS, therefore, becomes an integral part of the processes of strategic planning, programming, monitoring, and evaluation of a NARS.

An HRIS is usually designed to be utilized by all levels of management, including: agriculture ministries, agricultural research institutes or councils, research stations and, in some cases, research programs. The HRIS provides information which responds to questions about human resources in relation to projected program activities. Outputs of the system contribute to: recruitment plans, training plans, work plans, and decisions on re-deployment, compensation, promotions, and staff motivation.

2. Organization of Information

The HRIS is a collection of related pieces of data about current research staff. For use in management decision making, data are drawn from the data base, organized, combined, and reported in ways that inform the manager about the state of human resources in the system.

An HRIS can be defined as "an integrated data base of pertinent information on people and positions that can aid managers in evaluating the present status of the human resources in their organization, formulating objectives for activities relevant to human resources, and evaluating the success of those activities at a future date." (Cascio and Awad, p.583)¹). The primary focus of an HRIS is to assist managers in ensuring that research objectives are met. However, the HRIS can be designed to be compatible with routine administrative tasks like salary administration as well.

The most comprehensive use of an HRIS is for information about researchers employed by the agricultural research organization. However, an HRIS should also include information about technical support staff upon whom researchers depend to perform vital research tasks. Much of the personnel data requirements will be the same for every individual. This will include personal background information, basic data on education and work experience, training undertaken, ongoing research activities, work performance, and remuneration.

A research manager needs more information than that contained in an HRIS. Some related information useful for human resource management is external to a NARS, and special efforts may be required to acquire the information, e.g., training opportunities abroad and lists of potential recruits nearing completion of their degrees. Some information is external to the human resource system, but internal to the NARS, e.g., budget resources and program plans. Whether or not one uses a computer-based system, it is desirable to develop these files of external data to be compatible with internal HRIS data files for improved management decisions. For example, one could match specific training needs with training opportunities and quickly develop a training plan for some period in the future.

Other organized information may be developed for the following purposes:

1. Recruitment--Information about sources of new staff, including lists of those nearing completion of postgraduate degrees, can be organized for recruitment purposes.
2. Training opportunities--A listing of opportunities for specialized training, internally and externally, facilitates the matching of program needs and qualified staff with opportunities.
3. Motivation and behavior survey--Information from non-attributable surveys, such as for motivation and behavior of researchers, is maintained in a separate data base. This keeps the information anonymous and comparable from one time period to another.

3. Outputs of an HRIS

In creating an HRIS, a research manager first defines the desired output of the system, i.e. the reports and summaries needed for specific management purposes. Some of the reports an agricultural research manager would want to have from an HRIS include:

Human Resource Inventory--This is a report of the quantitative and qualitative characteristics of current research staff of the research unit or system. The inputs are primarily the biographical data about research staff. The report consists of a series of tables which describe the human resources numbers, quality, and output for each of the units in a system. These would include cross tabulations relating to staff education, discipline, age, years of service, position, publications, etc.

Human Resource Flows--This is a report of the status of human resources from one point in time to another. The information is based on the output of the inventory, but is a level of analysis which enables the manager to review the dynamics of the system. Using this information, it is possible to project future trends for human resources in the system. Statistics generated in this report include: attrition rates, turnover rates, and other changes in the characteristics of human resources over time (such as improvements in numbers with postgraduate degrees).

Human Resource Deployment--This is a report about the deployment and utilization of human resources described in relation to the organization and its research program objectives. Tables would show time allocations for each unit in the system for: functional responsibility (management, research, teaching, trainee, etc.), type of research (basic, strategic, applied, adaptive), commodity focus of research, location in the system, etc.

Training Assessment--This is a periodic report of the short- and long-term training (ongoing and completed) for research staff in the system. The summary allows for a monitoring of the training effort which can be substantial in many newly developing NARS. The report may also include information about training needs of individual staff in the future, derived from performance appraisals or management reports. Tables would show numbers of staff involved in degree training by discipline and/or unit, person days of short-term training by unit, etc. The assessment summaries would contribute to training plans for the future.

Researcher Performance Report--A report about researcher output is necessary to assess progress towards research objectives and to prepare general and annual research reports. Output is not always easy to measure, but publications of various types remain a fairly reliable indicator of output. Quantitative data on researcher performance (e.g., from a point system) can be obtained from performance appraisal documents and can be summarized and analyzed for each unit in the system.

Compensation Review--Summary reports relating to staff salaries and allowances, grades and steps, and promotions are important for effective human resource management. Since much of this data may be confidential, it is usually necessary to restrict access. The tables of information useful to a manager include those which show numbers of research staff in each grade and step, rates of promotion, costs of various components of compensation schemes, and relationships between various characteristics of researchers and their salary levels. This information contributes to planning and policy decisions designed to retain promising and effective researchers.

Motivation Factors--The HRIS will not contain information on researcher motivation, since it usually is not attributed to individuals. Survey data can be summarized in a separate data base, however, to show what factors are most critical in motivating staff, what problems management may address to increase researcher job satisfaction and performance, and how researchers feel about management decisions. This is an area for increased attention by many NARS managers.

4. Sources of Information

In practice, many NARS already have human resource data available in the form of personnel files for each individual employee. If the data are aggregated and organized, often it is only in a form required for administrative purposes like salary administration. Some of these data, however, can become the beginning of an HRIS. Conversely, an HRIS designed for NARS management/analytical purposes can also be functional for some routine administrative purposes and to meet some information requirements of other supporting agencies like civil service, budget, and national development units.

Several sources of data and organized information may be utilized for an HRIS. The basic data for an HRIS may initially come from central administrative records of personnel. Those data that cannot be collected easily or reliably in this manner can be obtained directly from agricultural research personnel themselves in the form of a questionnaire. This would be administered to all current personnel as part of the process of establishing the information system and, subsequently, to all new personnel when they join the organization.

It will be necessary to define a procedure for the annual update of the data base at a time when the output can be used for strategic planning purposes. Some data can be updated continually as part of the process of keeping good administrative records. For other data, research staff will need to complete an annual update form. The best timing for an annual update of the data base for the HRIS is prior to the performance review, when the data can also be used as information for appraisal purposes.

5. Managing Information

Ideally, an HRIS is a component of a larger management information system (MIS) which includes data on program, budget, and facilities, as well as personnel. Given the importance of human resources in a NARS and the fact that some organized data already exists in personnel files, the development of a comprehensive MIS may well start with a focus on personnel. The need to relate personnel to program activities, financial considerations, and the availability of facilities will create the environment for the eventual development of a full MIS.

The creation of a formal information system is often stimulated by the need to provide reports to an external agency or donor for a very specific purpose like the management of trainees. The availability of special funds for information management activities for such a specific purpose provides an ideal opportunity to develop and implement a more comprehensive system which will serve the routine needs of a NARS.

Difficulties in establishing and maintaining an HRIS are likely to occur in situations where a NARS is a loosely coordinated system of institutes, centers, and universities. In such cases, where the normal reporting requirements and employment conditions and practices may vary considerably between organizations, an agricultural research council or other coordinating unit may be charged with the responsibility for maintaining the system. A means of standardizing and accessing data would then need to be developed.

Management support and long-term commitment are essential in order to insure the effective institutionalization of an HRIS. One critical component of this support is the designation of a high-level manager to the function of human resource management, either part- or full-time. Once such support and commitment are in place, the most important task is to appoint and train the individual(s) who will have specific job responsibilities for developing (where appropriate), maintaining, and operating the information system. The actual design of the system is best developed collaboratively by senior managers and information/computer specialists.

For larger agricultural research organizations, the development and improvement of a human resources information system should be accomplished in stages, e.g., starting with one institute or program unit. This will permit the testing of a computer-based system on a small scale, should a computer be utilized for the HRIS.

An effective HRIS will require not only a high level manager, but also an appropriate location in the organizational structure. While the existing structure may provide few options for any one NARS, the range of options for many would include: a staff office to the director general, the planning unit, a separate HRIS or MIS unit, the data processing unit, the socioeconomic unit, or the personnel office. One basic decision is whether to locate the system with data providers or data users. While data providers must be part of the process, it is recommended that the operation be housed with data users. This would seem to indicate that the management of an HRIS should be with the planning unit or a staff office of the director general. In any case, an HRIS needs a firm and respectable home in a NARS.

6. Computers and Software

Although an HRIS does not need to be computerbased, computers increase the speed and range of data access. A computer-based information system for human resource management can be created and maintained using modern and relatively inexpensive microcomputers and software packages. Such a system can be used to store large volumes of data for both analytical/planning purposes and for administrative purposes. Effective systems are designed to meet well-defined management objectives, allow for data to be readily retrieved and analyzed, and be updated regularly.

Software - Commercial software tools that are available for maintaining and analyzing data fall into three main categories: statistical, spreadsheet, and data base management.

1. Statistical software is used primarily for storage and analysis of numerical information. Results of the statistical analyses are reported in tables, graphs, and standard statistical formats. Some packages can produce graphical displays of data such as box-plots and scatter diagrams.

2. Spreadsheet software allows easy mathematical manipulation of information that can be represented in a tabular format. The data as stored in rows and columns, much like an accountant's worksheet. Formulas that describe the relationships between the data elements are incorporated into the spreadsheet. When a piece of data is changed, all the other data elements linked to it change as well. Spreadsheets are ideal in situations where quick calculations for "what-if" analyses are required. In a human resource information system, for example, a spreadsheet could be used to determine the effect on total research expenditures of increasing the number of researchers in a certain field.
3. Data base management software stores related pieces of data in separate records, or sets of unique data. A computer data base stores personnel data, for example, in a format similar to physical personnel files. Each individual file folder containing data about one person corresponds to a record in the computer data base. Every record contains the same pieces of information: name, birthdate, academic specialty, etc. The complete data base is the set of all the individual records.

Computer-based data base management systems allow data to be selected from the data base for manipulation and analysis. For example, a human resources planner could extract information about discipline specialties and relate that to research program areas. The kinds of analysis possible using a computer-based data base are usually only limited by the information that has been put into the system.

Organization of Data - Research managers perform many tasks related to human resource management. Payroll, training, and recruitment, for example, are three separate management functions, each generating and using different sets of human resources data. Information used by one sub-group within the larger human resources management system is related to information used by another because it all refers to a single employee. In a computerized system, different subsets of information can be stored in separate data base files, related to the other files in the system by an employee's name or identification code.

Developing a system of separate but related files has several advantages over a system where one file contains the full set of data. Access to data is faster, more efficient, and easier to control. Access to salary information, for example, often must be restricted. Controlling access to data sets or files within a system is easier than controlling access to fields within a file.

Creating a System - There are two basic steps to creating a computer-based information system: (1) specify the goals of the information system and (2) define the data structure. Once these two steps are completed, appropriate hardware and software can be selected and the system can be put into operation.

Determining the goals of the information system is an important process that is often done poorly or not at all. Clarifying the purpose of the system in the beginning can insure that expectations are realistic and prevent wasted time, money, and frustration. In defining the overall purpose of the system, a manager identifies general problems for which an

information system could be useful. The next step is to develop a set of questions whose answers will address the general problems, being as specific as possible. At this point, it is possible to decide what aggregate information is needed to answer each of the questions and specify the information needed about individual researchers. At the end of this process, a research manager would have a set of questions to be answered and a description of the kinds of information that will provide answers to those questions.

7. Information for Human Resource Management Tasks

This section of the annex identifies the relevant questions for managers for each of the task areas identified in the HRM paper. For many of these questions, the following are indicated: (1) information requirements, (2) information sources, (3) potential information summaries from an HRIS, and (4) the organized reports to which an HRIS can make a substantial contribution.

Planning

A primary use of organized information about and related to human resources is for planning, whether annually for programs or at strategic times for policy-making. Once plans are made and accepted, implementation decisions may require even more detailed information. While planning occurs for all HRM tasks, it is a task in itself and one which focuses on the broad issues with which NARS managers must deal. Relevant questions for broad-based planning are:

1. What are the tasks that need to be performed and/or expected outputs to meet program plans/requirements?

Program-related information is absolutely essential as an input for effective human resource planning. Program plans must be adapted and combined with information generated from an HRIS for appropriate analysis. For example, it is necessary to disaggregate commodity plans into tasks and activities which need to be performed in order to place the plans in a human resources context. One of the products of this exercise is a task or job analysis which can later be used for recruitment purposes.

2. What are the resource constraints affecting the utilization of human resources to meet the program requirements?

These constraints may involve physical facilities, financial resources, transportation possibilities, organizational structures, civil service positions and policies, etc. If an MIS is already employed, this information may be readily available. To be useful with HRIS data, the constraints must be expressed in terms of their impact on human resources, i.e. facility capacities, budget available for personnel categories, ceiling numbers for staff categories, etc. Once the constraints are defined in this way and compared to the information about human resources generated from the HRIS, it is possible to identify possible trade-offs and areas for policy change. The result is a contribution to realistic recruitment targets and plans.

3. Are the human resources that are required for the program, given the constraints, already in the system?

The information generated to respond to this question comes directly from an HRIS and is utilized for many other HRM tasks besides planning per se. The basic information for each category of staff includes: personal data, technical and educational qualifications, employment experience, program activities, and some measure of performance. Most of the information can be obtained from employee files, but some will come from managers or the employees themselves.

The output and summaries constitute a human resource inventory which describes research staff age, education level, experience, etc. by units within an organizational structure or by discipline. Various levels of analysis can be performed on the data to establish ratios, averages, and percentages which help explain what human resources are available at a point in time in relation to the program requirements. This information and analysis can be used to generate reports on what kinds and qualities of human resources are required for a future time frame.

4. What changes are taking place in the quantity and characteristics of human resources in the system?

To deal with this question, it is necessary to have the capability to analyze the information in the HRIS at two or more points in time. The summary report on human resource flows will yield information about attrition rates, turnover rates, intra- and inter-institutional transfers, and trainee return rates. Managers require this information in order to predict future changes and develop recruitment, staffing, and training plans.

5. What are the options for improving the adequacy of human resources to meet the program requirements in the next time frame?

Options which need to be considered include: the possible availability of released manpower resulting from changes in program objectives and plans, the variety of actions which can be taken to modify the existing human resources (e.g., training), and the availability of and opportunity to hire new staff. In most cases, some mix of these options will be appropriate and/or conditioned by the resource or policy constraints. The information required for this level of planning includes: the inventory of human resources from the HRIS; some measures of recruitment, training, re-deployment, and other staff costs based on past experiences; and external information about the sources and availability of technical and scientific staff. Budget and expense information within the organization can be used in conjunction with an HRIS on a per unit basis for comparing the costs of various positive options. A separate data base can be maintained for information about the availability of national scientific staff who are in research degree programs within and outside of the country.

These are only some of the questions for planners concerned with human resources. The end product to which the organized information would contribute at this point is an overall manpower plan. In the best of circumstances, this would be an integral part of a development plan for the NARS.

Staffing

It is likely that new staff will need to be added to a NARS almost every year, either to maintain staff stability or to achieve planned growth. The management activities involved include the development of specific job descriptions, and the recruitment, assimilation, and deployment of new staff. A redeployment of some existing staff is almost always necessary to accommodate to the addition of new staff in a NARS. The major questions on staffing to which organized information can contribute to management decisions are:

1. What are the specific positions which need to be created and/or filled to meet the task requirements of the system?

Following identification of tasks that need to be performed, it is necessary to develop job descriptions and to identify the numbers of positions and locations where NARS staff will be deployed. The information required comes from: the human resource inventory and the report on human resource deployment which are derived from the HRIS, civil service regulations (for grades and steps), budgets, and detailed program requirements of each unit in the NARS. The output to which the HRIS will contribute is a set of job descriptions for specific positions in the system which show the education, skill, and experience levels required.

2. Where can qualified new staff be obtained for the NARS?

In most cases, NARS either include or at least have working relations with universities and colleges from which they recruit both scientists and technical support persons. Under certain circumstances it may be helpful to develop a separate recruitment data base which maintains information on potential candidates from those institutions who might be suitable for future positions in a NARS. This data base can be an abbreviated version of a file for an existing staff member and include similar information. This information can be utilized for a recruitment plan as well as a basis for collaboration with other institutions with research and training capabilities.

3. How can a new staff member be effectively assimilated into a NARS?

New staff need considerable information at strategic points of an induction period into a NARS. This includes information about: personnel policies which affect them; the mandate, objectives, and programs of the NARS and unit to which they are assigned; the specific job expectations for them; their relationship to supervisors, colleagues, and staff in other units; and performance evaluation criteria. It is recommended that research managers provide this information in an organized and strategic manner for persons in each position or unit.

4. What shifts in staff location and position are necessary to meet program objectives for the next time frame?

New program objectives, staff attrition, staff promotions, new staff employed and returning trainees together result in significant human resource changes within a NARS each year. The inevitable result is the need to re-deploy several existing staff in terms of physical location and/or position within the organization. Information from the HRIS report on human resources deployment will facilitate the process of reassignment to meet projected program objectives.

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The information needed for staffing relates primarily to the process and effects of hiring and deploying new staff. The remaining tasks of development, compensation, and evaluation relate to modifications which effect existing staff to meet program requirements. The following explains how organized information can be utilized for detailed planning and action for: researcher development, compensation practices, and researcher evaluations.

Development

One of the major and often initial uses of data bases in a NARS is for coordination of staff development (training) activities, particularly in heavy growth periods with donor participation. Staff development includes: in-house apprenticeship training, internal and external degree training, internal and external short-term training, and attendance at national and international conferences. The major staff development questions to which organized information can facilitate appropriate management responses are:

1. What new knowledge and skills are needed and when?

Changes in program priorities, turnover of staff, and requirements for new research methods and techniques contribute to a need for continued staff development. It is recommended that a training needs assessment survey be conducted annually as part of the performance appraisal. The survey would yield information about the need for short-term training in skill areas like breeding techniques, FSR methods, economic and statistical analysis, etc. It would also identify the need for degree training and for organizational behavior training to develop leadership capacities for research program management. An analysis of the information contained in the needs assessment survey will permit the manager to develop an organizational training plan for the year. The training plan would prioritize needs by training activity and form the basis for budgeting or discussions with donors prepared to support local and foreign training.

2. Who should be trained and what type of training is appropriate?

The HRIS provides data on past education and training activities for each researcher in the form of a training assessment report. This information allows the manager to select individuals for appropriate education and training. Selection criteria will, of course, include factors about individuals such as age, future potential, mobility, etc. The output is a training plan for each researcher to be activated, based on availability of training programs and financial resources.

3. What training opportunities exist in the NARS, the country, and abroad?

In larger NARS where several researchers may be involved in development activities, it may be appropriate to develop a data base of information about specific training activities within the country and elsewhere. Information about foreign opportunities is often available in organized, published form from donors who sponsor the training. Within the country, universities and private groups often are prepared to conduct training on demand. Identification of these researcher development activities in advance facilitates the process of matching needs with program opportunities.

4. What progress is being made by researchers involved in degree training?

An HRIS can be used to monitor research staff involved in training, particularly in institutions abroad. This will allow for better planning in relation to their return and the utilization of their expertise. Recruitment plans can also be improved by the addition of this information.

Compensation

The compensation schemes for research staff are often controlled by civil service or other outside agencies. Payroll and expense records are usually maintained by the NARS for administrative purposes. An HRIS can utilize this and other data and information to facilitate career planning, to make policy and program decisions on costs, and to seek major and minor changes in salaries and other benefits. Information from a compensation review report generated from an HRIS can help research managers address the following questions:

1. Is the scheme of service adequate for retention and motivation of staff?

A critical factor in retention of researchers is the potential for regular promotion in the system, including adequate increases in salary and other benefits. An HRIS can help monitor rates of promotion and identify problem positions. Persons who remain in a position too long may become stagnant and lack motivation for improvement.

2. What are the costs of staff in absolute and relative terms?

One of the critical factors in research management is to maintain control of costs. The HRIS can be used to focus on personnel costs. Other cost information will enable the manager to see if researchers have sufficient support to be effective and productive.

3. Are researchers being rewarded for exceptional performance?

Information from performance reviews can be combined with salary, grades, and promotions to determine if the system is rewarding those who are most productive.

Evaluation

One of the most difficult, but important tasks of a manager is performance appraisal, particularly of scientists. The task is made easier if developed as a performance planning and appraisal system and conducted as part of a larger planning exercise for a NARS. An HRIS can be used not only for individual performance information, but also to analyze specific elements for planning and action (e.g., to develop a training plan and activities). Management questions on staff evaluation include:

1. Have individuals met performance expectations? If not, why?

If a NARS has established norms and expectations for researcher performance and conducts regular performance appraisals, it is possible to summarize data from the HRIS which indicate a level of performance or rating for each researcher. Since this is recorded for professional, personal, and administrative performance, the information is useful for counseling, promotions, staff development, and re-deployment of staff.

2. Is overall staff performance consistent with organizational and program plans and objectives?

The relation of researcher output to program objectives and priorities is a major concern of agricultural research managers. Summaries of publications and other indicators of performance can be generated from the HRIS to compare with program planning documents. This allows the manager to monitor and evaluate actual versus planned performance of staff.

3. What motivates staff to improve performance?

Information relating to researcher performance comes from the performance appraisal data for each individual in the HRIS and from a non-attributable survey completed periodically by research staff. Researcher performance reports from the HRIS provide basic information about levels of performance. The survey provides more direct information about perceptions of staff and about critical factors which motivate them

to improve their performance. The output of these two sources is a researcher performance report which contributes to policy decisions relating to human resource recruitment, deployment, compensation, and development. It is also useful for counseling and crisis management.

4. What actions are required to assist staff in meeting performance expectations?

Performance appraisals and surveys yield information about the reasons for a particular level of performance. Some of these relate to researchers, but often they relate to the organizational and program environment conditions over which a manager has some control. An effective information system will allow managers to evaluate the effects of policies and procedures which influence staff performance.

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Summary

Effective research management requires a continuous flow of information, particularly about the utilization of human resources in relation to changing program objectives and priorities. It is important that this information be useful for planning and management purposes, reasonably accurate, comparable from year to year, and from unit to unit. It should be easy to obtain, update, and analyze for specific actions and should be presented in a clear, easily understood format. Also, the information should be readily accessible to and functional for managers at all levels at which human resource decisions and actions are required.

Research managers require reasonably accurate data about the following: the number of research personnel available in various categories, the qualifications and maturity of these persons, past experience and future potential for recruitment, the deployment of staff, levels of training of staff, program activities of research staff, and the level of staff productivity.

An effective system organizes information in anticipation of the annual planning/budgeting cycle and, thereby, is effectively integrated into a planning, budgeting, and monitoring system. This means, for example, that the process of performance reviews would yield information for the system about allocation of staff time to a particular activity and/or commodity. Given a change in activity and/or commodity focus in the next planning time frame, such information would form the basis of decisions about recruitment, training, and re-deployment of staff.

A minimum data management system specifically designed to allow comparisons between various units at all levels within a NARS can be readily established in a NARS. Such a system incorporates standard items of data and includes some standard types of analysis and reports. One advantage of the system is that it shows norms and ranges for several management factors such as ratios between scientists and technical support personnel. The structure of the system makes it possible for

institute managers to compare specific management factors for their organization with those for other institutes and for NARS managers to do the same with respect to other NARS. The system would contain standard statistics which allow for the monitoring of changes from year to year.

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TRAINING AND EDUCATION FOR MANAGEMENT OF RD&A ACTIVITIES

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WHY TRAIN OR EDUCATE FOR MANAGEMENT?

Research, development, and applications (RD&A) to solve forestry-related problems have grown substantially around the world and are expected to expand rapidly in developing countries. To achieve desired goals and objectives, managers of these RD&A activities must be effective, and the effectiveness of management depends upon the capabilities and experience of the managers. The usual situation of RD&A managers, regardless of the technical field or the state of economic development in a country, is that they are promoted from the ranks of scientists into managerial positions. Most scientists are neither specially trained nor educated for their managerial assignments. Usually they have learned management on the job by suffering through difficult situations, by emulating successful superiors, and by coaching received from superiors or peers. In developed and developing countries alike, training and education too often are nonexistent, meager, or unavailable to scientists moving upward as managers.

People responsible for RD&A programs related to forestry have recognized and responded to this need for managerial training and education of leaders. In developed countries such training and education have been underway for 25 years. In developing countries it started in 1984. The expectation is that RD&A institutions led by trained managers will become more effective and efficient and will be able to build and retain high quality staffs.

Training and education to improve managerial capabilities are available and should be utilized to meet the expanding needs of RD&A leaders around the world. International training activities to improve management of agricultural RD&A activities have been underway for more than a decade. Managerial training programs have been utilized since the 1960s by some forestry-related RD&A institutions in developed countries. Five training courses for managers of forestry research activities have been provided in Southeast Asia and Africa during the past five years. A workshop for Africa on training for management of forestry research is being organized by the International Union of Forestry Research Organizations (IUFRO) at Nairobi, Kenya, June 21-30, 1989. These courses in Southeast Asia and Africa were designed to provide a first exposure to what is known about management. They have reached only 10 to 15 percent of the forestry-related RD&A managers needing training.

Global Expressions of Need

Calls for expansion of forestry-related RD&A activities in developing countries, particularly those countries having tropical forests, have been published repeatedly during the past decade. These calls came from the VIIIth World Forestry Congress (Wyatt-Smith, 1978), the XVIIth World Congress of IUFRO (World Bank & FAO, 1981),

the Food and Agricultural Organization of the United Nations in its *Tropical Forestry Action Plan* (TFAP) (FAO, 1985), and two recent conferences of world leaders at Bellagio, Italy (World Bank, 1987; World Resources Institute, 1987) and at Wiston House, near Brighton, United Kingdom (Fugalli, 1988). These meetings and associated reports called for strengthening the infrastructure of existing RD&A programs and building effective teams to manage new and expanding programs. Bengston and Gregerson (1988a, 1988b) documented indirectly many managerial problems that hinder research capacity in developing countries. Reports from missions to developing regions and countries, organized by the multilateral and bilateral TFAP Advisors (1986, 1987), repeatedly recommend strengthening existing RD&A programs and adding urgently needed new RD&A programs. IUFRO, through its Special Programme for Developing Countries and the proposed transformation of that program into INCOFORE (IUFRO, 1989), has pointed to the need in developing countries for training leaders of forestry-related RD&A institutions in the science and art of management.

Reasons for Training and Educating Managers

Managers who are adequately prepared for their jobs can improve the efficiency and effectiveness of their institutions and create desirable conditions for work. Benefits result not only to the clients and sponsors of the institutions, but also to the staffs of the institutions, and to the managers personally. Good managers increase outputs. The result is satisfaction to producers internal to the institutions, to external clients or users in need of new or improved technologies, and to those who finance productive enterprises. Leaders should understand and relate to the factors influencing behavior and motivation of their staffs. By so doing, they can strengthen morale, esprit, and cohesiveness within their institutions. Perhaps most important, competent managers can improve their personal situations by reducing or eliminating stress and anxiety for themselves, their subordinates, and their superiors.

Managers and Management of RD&A

Before delving into the training and education of managers it might be helpful, particularly to readers whose first language is not English, to define meanings of some terms. Being an American, I seek definitions by Webster, but those in the Oxford English Dictionary are substantially the same. According to Webster,

- **management** is "the act, art, or, manner of managing, or handling,, controlling, directing, etc. . . . skillful managing; careful, tactful treatment." A **manager** is "a person who manages affairs or expenditures . . . skillfully and carefully."
- **to train** is "to instruct so as to make proficient or qualified; . . . ". A synonym is to teach, but Webster distinguishes that training "implies the development of a particular faculty or skill, or instruction toward a particular occupation, as by methodical discipline, exercise, etc."
- **to educate** is "to give knowledge or training to; train or develop the knowledge, skill, mind, or character of, especially by formal schooling or study; teach; instruct. . . . **educate** stresses the development of latent faculties and powers by formal, systematic teaching, especially in institutions of higher learning."

These definitions point to some of the purposes and functions of management and managers. They contrast training, which is usually informal and associated with a particular job or kind of work, with education, which usually is formal and theoretical and gained through courses in a college or university.

TRAINING AND EDUCATION FOR MANAGEMENT

To both expand on the definitions of management and identify some topical needs for training and education, we can examine the goals, objectives, and activities of managers. We will follow the managerial steps starting with first-line supervisors and progressing to middle-level managers and executives. At each step, the managerial functions directed at the four resources of every institution—people, funds, facilities, and information—will be listed.

First-line Supervisors

Most individuals become managers for the first time when they accept responsibilities to supervise subordinate employees in the field, laboratory, or office. They anchor a line of supervisors that extends upward through a second-line supervisor to the head of the institution. The introduction to management of financial resources typically occurs when an individual is given limited delegations of authority and responsibility for obligating and expending funds. Individuals who are made responsible for individual laboratories, field stations, or specialized equipment or property thereby become managers of physical resources. Involvement in managing informational resources begins for scientists and others when they produce their first report or publication or become involved in an institution's internal or external communication systems.

Supervision. Having responsibilities for subordinates introduces a first-line supervisor to new duties and responsibilities toward people. When fulfilling these responsibilities, each new supervisor must rely on his or her experiences in life and as a subordinate worker and on coaching by his or her peers and supervisor. The strains experienced by beginning supervisors during management of human resources can be eased through training on the job, but an external short course on elements of supervision can be helpful and is especially recommended. Such training should cover:

- understanding human behavior and motivation
- recruiting new employees, including the art of conducting an interview.
- orienting new employees to the organization and place of work
- delegating authority and responsibility for work
- describing work to be done both verbally and in a written position description
- training to accomplish assigned work and fulfill delegations
- coaching to warn of lagging performance and to improve performance
- explaining and using standards for measuring performance
- appraising and discussing performance
- using incentives to improve performance
- handling less-than-satisfactory performance and related problems
- rewarding superior performance through awards and promotion

- displaying propriety, tactfulness, and empathy toward subordinates
- distinguishing between symptoms and causes of problems
- reporting about subordinates to superiors and outsiders

Management of other resources. On-the-job experiences and internal short courses usually are adequate for beginning managers to learn about an institution's financial, physical, and informational resources. Limited authority for purchasing usually is the scientist's introduction to management of financial resources. Training on the job is the usual procedure for learning about an institution's internal procedures for obligating funds, paying bills, and handling accounts. Explanations of and tutoring in construction and use of budgets usually is best done by the second-line supervisor. Similarly the second-line supervisor and an institution's property-management specialist are in the best position to train new managers on procedures for discharging responsibilities for physical resources. Each institution should formalize its processes to train new managers and should not leave such training to chance or to the new manager's individual initiative, which unfortunately is the usual case.

Management of RD&A programs. Each RD&A institution should have formal policies and procedures for managing work to fulfill its mission. First-line supervisors, being at the bottom rung of the managerial ladder, need to have a basic understanding of these policies and procedures. In-house training is essential to enable each first-line supervisor to communicate and interpret these policies and procedures accurately and clearly to subordinates. Basic training should cover:

- organizational structure showing the place of each unit and individual
- planning of RD&A programs including identification and priorities of problems
- monitoring and evaluating progress of work and accomplishments
- communicating and reporting both internally and externally

Middle-level Managers

Mid-level managers characteristically are in charge of one or more organizational units including projects, branches, or centers. By definition, they are in the middle of the line (chain) of command. Characteristically each middle manager is responsible for several first-line supervisors and reports to someone at the executive level. As managers, their substantial delegated authorities and responsibilities often include:

- recruiting to fill approved positions
- budgeting for the unit and overseeing its obligations and expenditures
- planning and approving all technical work to realize the goals of the unit
- monitoring and evaluating progress of all work within the unit
- authority for further delegations to accomplish work of the unit
- recommending to executives on decisions affecting the unit and the institution

Mid-level managers usually are involved full-time in managing human, financial, physical and informational resources. For the most part they learn how to do their jobs by having observed superiors, who were middle managers, and through coaching by their peers and superiors. Leaders at this level are positioned to benefit greatly from the world's knowledge about management. Their experience is such

that they can relate to almost all of these topics for managerial training and education:

- dealing with human frailties, including insubordination, abuse of drugs and alcohol, civil rights, abuse of time and attendance, irregularities involving funds or facilities, and unethical behavior
- leading and motivating subordinates
- understanding and fostering creativity
- planning RD&A programs
- organizing for work, including span of control, organizational effectiveness, matrix organizations, and networking
- controlling and monitoring programs of work
- evaluating organizational units and accomplishments
- managing complex delegations of authority and responsibility
- cooperation versus competition in dealing with other units and institutions
- decision-making skills
- problem-solving skills
- communication skills, such as briefing superiors, writing effective letters, dictation, and both writing and speaking to the public
- managing within budgetary constraints
- justifying changes of plans and budgets
- using time effectively
- holding effective meetings
- performing staff work for executives

Executives

Every significant RD&A institution has at its upper organizational level one or more executives who are, or certainly should be, accomplished managers. Executives usually are at the top of each line (chain) of command. Some executives may serve in staff positions, outside of the line, where they typically have special responsibilities for external relations, planning, auditing, or other topics having great importance to the institution. Reporting to an institution's chief executive officer (CEO) would be the other executives and perhaps some or all of the middle managers. The CEO usually reports to a superior executive in a sponsoring institution.

Executives usually receive their managerial training from on-the-job experiences as they climb the ladder of success. However, in some developing countries such ladders may be short with the result that individuals in executive positions may benefit greatly from training in the topics listed above for middle managers.

Executives, being at the top of the management team, are occupied less with routine aspects of management and more with assuring survival and growth of the entire institution. Their training and education should include these important topics and subtopics:

- dynamics of the work-force
 - planning for changes in the composition of the work-force
 - building satisfying career paths for scientists who are not managers
 - recruiting and retaining managers and specialized employees
 - meeting institutional needs by training and educating employees
 - providing incentives to improve performance and morale

- dealing with organized labor
- managing budgets and funds
 - building alternative budgetary scenarios for the future
 - allocating funds to subordinates using alternative strategies
 - improving the timeliness and utility of periodic reports
 - providing accounting services useful to middle and first-line mgrs.
 - improving audits and other financial controls
- obtaining additional funds
 - identifying sources of funds
 - constructing attractive justifications and proposals
 - lobbying for increased funding
 - gaining support by influential people
 - recognizing and dealing with competition for funding
- managing when funds are cut
 - planning for contingencies
 - eliminating weakness or unresolvable problems
 - suffering through versus aggressively reducing staff or programs
- relating to other institutions
 - building bridges
 - cooperating
 - competing
- understanding global, regional, and national strategies
 - economic development
 - role of RD&A institutions
- getting forestry research on the national political agenda
 - increasing priorities for forestry research
 - explaining how forestry research contributes to attainment of national goals
- *Management by Objectives (MBO)*
 - identifying and agreeing on objectives for work
 - measuring progress toward objectives
 - evaluating results of work
- evaluating RD&A programs and activities
 - estimating costs of projects and programs
 - itemizing and evaluating accomplishments
 - assessing benefits to society
 - relating benefits from accomplishments to costs of RD&A
- disseminating information to the public and to clients
 - Linking research with training and educational programs
 - demonstrating applicability of findings from R&D
 - assessing effectiveness of different communication media and publications
 - structuring a public relations program
- using advisory bodies and consultants
 - standing versus *ad hoc* bodies
 - creating and using technical teams
 - avoiding biases of individual consultants

- enhancing creativity
 - understanding the creative intellect
 - measuring an individual's potential for creativity
 - providing working conditions that foster creativity
- improving communications
 - building and using a system of formal directives
 - relating to the web of informal communications
 - providing training in public speaking
 - providing training in technical writing
 - providing training in letter writing
- understanding group dynamics
 - recognizing differences among and within groups
 - expressions of formal and informal leadership in groups
 - building participation in a group's activities
- leading and motivating institutions
 - understanding concepts of leadership
 - dynamics of change within organizations
 - managing conflict and change
- planning methods
 - strategic planning
 - *Goal-Oriented Project Planning (GOPP)*
 - *Program Evaluation Review Techniques (PERT)*
 - *Critical Path Method (CPM)*
- meeting technical needs of scientists and specialists
 - providing consultation on statistics and experimental design
 - providing adequate computing services
 - providing editing, writing, and publishing services
 - providing adequate scientific and technical information services

EXPERIENCE IN TRAINING AND EDUCATING MANAGERS

The above listings of topics and subtopics related to management demonstrate the dimensions and complexity for training and educating managers of RD&A institutions. Obviously on-the-job training can only begin the process of learning about management. To become proficient, managers must participate in training and educational programs that provide broad and deep experiences. In developed countries use of such programs has been underway for 20 or more years. In a few developing countries, notably India and the Philippines, the needs for and benefits from such programs have been recognized, and managerial training programs have long been in use. In most developing countries training and education for management have not been emphasized or available, but that situation is changing.

Training for Management of RD&A in Developing Countries

Experience in the Asia-Pacific region. The need for managerial training in developing countries was vividly brought to my attention in August, 1982. The occasion was the first Asia-Pacific Regional Workshop for Forest Research Directors.

The Environment and Policy Institute of the East-West Center had gathered these executives at the University of Hawaii to ponder the needs and priorities for forestry-related RD&A programs. To everyone's surprise, they gave highest priority to solving managerial problems in RD&A institutions and programs. They urged the multilateral and bilateral sponsors attending the conference to provide managerial training for themselves and their staffs.

Accepting that challenge, the International Development Research Centre (IDRC) of Canada organized the world's first international training course for managers of forestry-related RD&A institutions. The three-week course was delivered 22 October—8 November 1984 by the Human Resource Management Unit in the School of Management at the National University of Singapore. Attending were 29 managers from 11 countries in Asia and Southeast Asia. A few were first-line supervisors, most were middle managers, and a few were executives.

The success of the first course led to a second course, 22-28 September 1985, organized by the same institution. The United States Agency for International Development (US-AID), sponsored that abbreviated, one-week course. Being trained were 15 managers of the international watershed research project from four ASEAN countries.

Having benefited from these training courses, the Director-General of the Forest Research Institute of Malaysia (FRIM), Dr. Salleh Mohd. Nor, decided to provide similar training for all managers at his institute. Using financial support from the German Association for Technical Cooperation (GTZ), he organized in February, 1987 the first training course to serve the entire management team at a single institution. This was the first such course in a developing country and perhaps in the entire world. The excellent facilities and staff of the Malaysian National Institute for Public Administration (INTAN), located at Bukit Kiara, near Kuala Lumpur, were utilized for the course. The three-week course for 22 participants was modeled on the first course delivered at Singapore, but the experiential training focused on generating team spirit and on solving some of FRIM's recognized managerial problems. Both the training and the recommendations that resulted from teamwork during the training have significantly affected management at FRIM.

As the Vice President of the International Union of Forestry Research Organizations and an enthusiastic supporter of managerial training, Dr. Salleh decided to organize a third international training course for managers of forestry-related RD&A institutions in Asia and Southeast Asia. He once again involved INTAN in cooperation with FRIM to organize and deliver the course. Again both US-AID and IDRC sponsored participants. Training was given during three weeks, 18 July—5 August 1988. Attending were 23 trainees from 19 forestry RD&A institutions in 8 countries. Trainees at the close of the course enthusiastically endorsed the training received and recommended that it be offered again so more of their countrymen could be trained.

Dr. Salleh's goal is to gain support for a continuing program of international managerial training for forestry-related RD&A institutions in the Asia-Pacific region. Most developing countries in that region lack access to such training courses. An estimated 40 to 50 executives and 150 to 200 middle-managers from 15 countries need training in the theory and practices of management. Dr. Salleh seeks financing during 5 years at the level of US\$55,000 per year to support two annual training courses. The funds, to be obtained from one or more multilateral or bilateral donors, would be used annually by FRIM and INTAN to organize and deliver two

courses—one lasting five to seven days for 8 to 12 executives, and another lasting three weeks for approximately 25 middle-managers (see Appendix A).

Here are some of the lessons learned from the four managerial training courses given in Singapore and Malaysia.

- Hundreds of managers in the Asia-Pacific region need training.
- First-line supervisors, middle managers, and executives should be trained separately.
- Duration of training courses should be about two weeks for first-line supervisors; three to four weeks for middle managers; and one to two weeks for executives.
- The optimum number of trainees per course varies—for first-line supervisors and middle managers, 18-24; for executives, 6-10.
- Governmental training facilities have advantages over academic settings.
- International training will not occur unless some institution accepts responsibility for organizing successive courses to meet regional needs.
- Training should be institutionalized at one place where an investment should be made to build a cadre of qualified and experienced trainers.
- After trainers are qualified and experienced, they can be called to an RD&A institution to provide needed training.
- Experiential training is preferred, and lecturing should be minimized.
- If time is limited, then the number of topics should be reduced but not the depth of coverage of each topic.
- Training curricula and methods should be modified in recognition of variation in national and regional cultures.
- Simultaneous training for all members of the management team at one institute has significant advantages—economy, building managerial teamwork, and identifying solutions for managerial problems.

Experience in Africa. Managerial training for leaders of forestry-related RD&A institutions in Africa started at Nairobi, Kenya, 13-29 October 1986. Having heard of the successes with managerial training at Singapore, leaders in the Finnish International Development Agency (FINNAIDA) decided to provide similar training for Africans. The Forestry Training Program of the National Board of Vocational Education of Finland with assistance from the Finnish Forestry Research Institute organized a *Training Course on Forest Research Management for English-Speaking Africa*. It was attended by African leaders of forestry-related RD&A institutions from 8 countries. That course was organized as a seminar with papers being delivered and discussed and ultimately published as a proceedings (Temu *et al.*, 1987). This seminar format differed substantially from the experiential training methods and limited lecturing used in Singapore and Malaysia.

A second meeting on training for management of forestry research institutions in Africa has just been announced. IUFRO's Special Programme for Developing Countries, using financial support from The World Bank, is organizing a bi-lingual workshop in Nairobi, Kenya, June 21-30, 1989. Approximately 20 executives from forestry research institutions in Africa will be addressed by 10 international experts on management of RD&A institutions. The workshop will provide a seminar-style training experience for the African participants. The organizers hope the workshop will identify needs for managerial training at forestry-related RD&A institutions in Africa and will generate recommendations on strategies for providing managerial training in Africa.

Experience in Latin America. To date no interest has been expressed in managerial training for the forestry-related RD&A institutions in Latin America. I have no doubt that considerable interest could be generated if a course in Spanish or Portuguese were to be offered by a multilateral or bilateral sponsor. Perhaps IDRC, GTZ, or US-AID, having successfully sponsored managerial training in the Asia-Pacific region, would be willing to offer such training in Latin America. A champion is needed. Someone, who wants such training in Latin America and is willing to work hard to achieve it, should explore possibilities with potential sponsors.

Training for Management of RD&A in Developed Countries

For many managers of RD&A institutions in developed countries the situation is not much different from that in developing countries. It is customary for managers of RD&A activities at academic institutions to have had only on-the-job training and not to have taken advantage of available opportunities for managerial training and education. Standing in sharp contrast are many RD&A managers, particularly those employed by governmental agencies or industry, who have had extensive training or educational preparation for management of RD&A institutions.

Having served for 25 years as a manager of R&D for the Forest Service in the U.S. Department of Agriculture (USDA), I can report, as an example, on the managerial training undertaken by that agency. Before or immediately upon becoming a supervisor for the first time, supervisory training for 80 hours (two weeks) is required. This requirement can not be met by on-the-job training but only by attendance at a course given by a qualified trainer.

A general rule requires that each federal employee be in training for at least one week every year. For rising managers, a variety of one- and two-week courses are available from the Forest Service, USDA, other federal agencies, and the private sector. These courses cover all of the topics listed above for middle managers and executives.

All project leaders, as middle managers, are expected to attend a two-week course in Washington, D.C. There they learn how research in the Forest Service manages its programs, funding, reporting systems, and external relations with other federal agencies and the Congress of the United States.

Executives in Forest Service research are expected each year to spend one or two weeks at courses offered by the Federal Executive Institute and other sources. Before advancement to the level of senior executive, managers are assigned (detailed) to work outside of the agency for several months. The purpose is for them to learn about management of other RD&A organizations or to attend special programs given by universities.

One key element in this training program is each manager's 3- to 5-year training plan. The plan is negotiated by the manager with his or her immediate supervisor and is concurred to by the second-line supervisor. The plan specifies attainable objectives and lists the training needed to achieve each objective. The plan thereby becomes the basis for the manager to request approval for needed training or for his or her supervisor to present a training opportunity.

WAYS TO TRAIN AND EDUCATE MANAGERS

The preceding section points out that learning can be accomplished in diverse ways. The science and art of management can be learned from job-related experiences, by details to work elsewhere, by self-study, by coaching or tutoring, and by attending short-courses or academic courses. These options will be examined in greater detail in the following sections.

On-the-Job

It is often said that "experience is the best teacher", and so it is with experience gained on the job. Each person's learning from experience starts in the home where the parents manage the child and where siblings and other relatives have managerial responsibilities. Learning management from experience continues during many years of schooling and after entry to the world of work. Each person's accumulation of experiences conditions his or her perceptions and reactions to being managed by others and, in turn, on being the manager of other people. From our own lives we recognize that these experiences are both good and bad and thereby can positively or negatively influence our perception, our behavior, and our managerial style.

Learning management on the job has several advantages. The learning situations are real and not theoretical or contrived. Learning occurs at a relatively slow pace and is easily assimilated. What is learned is usually practical and workable. The tangible costs of learning are low.

However, the intangible costs and losses from experiential learning can be substantial. Learning on the job has several other disadvantages. Foremost is that one can not expand his or her learning beyond the job-related circumstances. Growth in learning is relatively slow, unless one moves relatively quickly through a succession of jobs, each different from and more difficult than the last. A danger in learning on the job is that what is learned may not be the best or even a correct way of managing. Learning on the job rarely requires the manager to consider all alternatives for action and to analyze all positive and negative consequences of a managerial decision or action. Learning on the job also suffers from a lack of oversight by a skilled manager as occurs by a coach, tutor, or course instructor.

Special Assignments

The pace of learning on the job can be accelerated by exposing a manager to a variety of work situations. Assignments (details) to work for relatively short periods of time in unfamiliar positions or at different locations provide diverse and enriching experiences. Such assignments accelerate the learning process. New people, changed conditions, and different circumstances—all require quick assessments, appraisals, decisions, and actions.

Details, besides being used to accomplish a special task, help the person(s) involved to grow. A detail to work that differs substantially from the manager's current job will provide broadening experiences that may be useful in future managerial positions. A detail to work that is closely aligned with the manager's current job may provide learning that will be directly useful upon return to that job.

Special assignments have associated costs that must be weighed against the expected benefits. The absence of the person sent on detail may result in problems or difficulties with the work that he or she was managing. Assignment to another task, even for a brief time, has debilitating distractions. The detailer, before absenting him- or herself, must think about disassociating from the current job, undertaking new tasks, and what may be difficult personal changes. Then upon returning from the detail, the manager experiences further difficulty in dissociating from the engaging work done on the detail. Generally these costs are substantially outweighed by the organizational and personal benefits that result from special assignments.

Self-Study

Learning about management from reading, listening to tapes, and watching movies or videos can be rewarding, pleasurable and relatively inexpensive. Books and magazines dealing with management can be borrowed from most libraries. Each RD&A institution should subscribe to periodicals on management and route them past the managerial team. To subscribe to *Research Management* and similar journals for managers is just as important as to subscribe to scientific and technical periodicals for the RD&A staff. Each institution also should build and maintain a managerial bookshelf where managers can borrow documents to read on the job or at their leisure. For personal development and growth, every manager should commit significant time to self-study on the job, when traveling, and at home.

Although it can be more difficult to borrow tapes, movies, and videos, they are available. For example, the American Management Association has an extensive catalog of multimedia training materials related to many aspects of management. Sometimes the comparatively high costs of these materials can be shared by several users.

A primary advantage to self-study is that you decide the direction and pace of learning. You may specialize or skim. You decide when and where to study and how long to spend at it. Another advantage is that it costs relatively little, particularly if you can borrow from libraries or other students. If materials for self-study are costly, then the employer may be willing to pay the costs, or other managers may be willing to share the costs.

Self-study requires the student to display initiative in setting personal goals and objectives, in obtaining materials for study, and in relating what is learned to his or her managerial situation. Anyone who has taken a correspondence course knows that a major difficulty in self-study is disciplining oneself to commit the required time and energy.

Coaching and Tutoring

Everyone has learned from a wiser or more experienced person. Each manager's supervisor should provide instruction, guidance, and advice, and otherwise serve as a coach or tutor. Coaching also may come from one or more managerial peers or from a hired consultant. Sharing of experiences helps colleagues to understand managerial problems, solutions, and alternatives for proceeding in difficult situations.

Lucky is the manager who has a mentor—a loyal friend, who serves as a wise advisor, teacher and guardian. Mentors not only help and give good counsel, but they protect from adversities and difficulties. Mentor-relationships often occur spontaneously, but they also can be arranged. A junior manager may personally seek such a relationship, or a mentor may be assigned to a junior manager.

Coaching, tutoring, and mentoring all facilitate two-way communication. They speed the flow of advise and counsel from more experienced to less experienced managers. They provide someone to turn to when the junior manager is troubled or confused. They are inexpensive yet highly effective aids to learning.

Difficulties with this approach to learning can occur. Coaches, tutors, or mentors may not be available. Those who are available may lack requisite wisdom or experience. Interpersonal difficulties or problems in communications may block the essential two-way flow of information. A manager faced with such difficulties definitely needs to go elsewhere to learn about management.

Short-courses and Academic courses

Short training courses and formal academic study provide desirable venues for learning about management. Specialized courses may last from a few days to a few weeks. Managers usually can be absent from their work for training purposes during such short periods of time. Short-courses usually are tailored to the practical needs and circumstances of specific individuals. The result is that most of what is learned is closely related to the specialized duties and responsibilities of the trainees.

Educational courses at universities or colleges tend to cover topics broadly. They focus more on theories and principles than on procedures and practices. Rarely do academic courses cover the peculiar and special problems encountered in the management of an RD&A institution. Academic courses usually require attendance for a relatively long period of time.

A single course at an academic institution usually must be attended one or more times a week for three to five months. To learn about all aspects of management, most students spend one to two years in full-time attendance at a college or university. Someone wanting to study only one or a few managerial topics might enroll on a part-time basis for one to two years and take a sequence of related courses.

Coursework, whether delivered in a shorter or longer time, has numerous advantages. Courses instill a discipline to the learning process. They concisely present a great deal of information. Presentation usually is by one or more teachers or trainers whose expertise has been established. Because the manager usually is required to leave his or her place of work and job-related responsibilities, the job interferes little with the learning process. But if a course is taken at the manager's place of work, then potentials are great for conflict between the job and the learning process.

However, being gone from the job creates a vacancy and may result in substantial costs. When a vacancy can not be tolerated, then someone must be reassigned to act for or even to replace the absent trainee. If the trainee is not replaced, his or her undone work may result in losses or problems.

The direct costs of taking courses also can be a deterrent to the learning process. Costs of travel, enrollment, and living away from home often are prohibitive. Particularly troublesome in most developing countries are constraints on obtaining foreign currencies for training and educational purposes. In this regard multilateral and bilateral sponsors can help by supporting the travel, enrollment, and living costs of trainees who would otherwise be unable to participate in courses.

RESPONSIBILITIES FOR TRAINING AND EDUCATING MANAGERS

The growth in learning, capability, and capacity of members of the management team depends upon the executives of an institution. Their responsibilities are to establish and utilize both policies and procedures for training and educating members of the management team.

- First, executives should assure that the institution has a clearly written policy on training and education for managers.
- Second, they should utilize annual appraisals of performance to identify each manager's needs for training and education.
- Third, they should encourage each manager to display initiative by learning more about management through self-study, by requesting to attend courses on management, and by suggesting short-term details.
- Fourth, they should require each supervisor of a manager, including themselves, to pursue training and education of their subordinate managers through a variety of means.

The performance of every manager should be evaluated annually. The performance rating and its discussion with the subordinate manager should be the occasion for agreement on training or education to improve or enhance current performance or to prepare for future assignments. Every manager should have a 3- to 5-year training plan that is updated at each annual performance appraisal.

Implementation of each manager's training plan should be the joint responsibility of the manager and his or her supervisor. The manager has the responsibility to search for appropriate courses and to request permission to attend them. The supervisor has the responsibility to tell the subordinate about opportunities for learning more about management. Included would be documents for reading and beneficial courses. The supervisor has the added responsibility to seek out, yes, even to create, opportunities for special assignments that will enrich the manager's experiences and contribute to his or her growth.

IDENTIFYING PERSONAL NEEDS FOR TRAINING OR EDUCATION

The foregoing sections have repeatedly called for every manager to have a 3- to 5-year training plan. Every manager should have the responsibility for drafting such a plan, but the manager's supervisor should have an equal responsibility to review and improve upon the draft. The plan resulting from their joint work should be sent to the second-line supervisor who should have the delegated responsibility to accept it for the institution.

Outlined here are some of the factors to consider when constructing a multiyear managerial training plan:

- assess your strengths and weaknesses as a manager
 - what do you do well or easily?
 - what situations or problems cause you difficulty?
 - involve your superiors, peers and selected subordinates in answering these questions
- identify managerial topics about which you want to learn more
 - scan a few basic books or periodicals on management
 - talk with managers whom you admire
- build your managerial training plan
 - involve your superior and peers
 - start with your identified needs
 - write some specific objectives for improving your knowledge, skills, and abilities that you can attain in three years
 - identify intramural and extramural opportunities for attaining your objectives
 - propose a schedule of self-study, attendance at short-courses, special assignments, etc.
 - put this information into a draft training plan
 - seek the time and resources to attain your objectives
 - negotiate amendments to the draft plan with your supervisor
 - produce your revised training plan
- have your plan approved by management
 - present your revised plan to your second-line supervisor
 - learn what elements of the plan are and are not acceptable
 - produce the final plan that is acceptable to the institution

RECOMMENDATIONS FOR TRAINING AND EDUCATING MANAGERS

At this point it seems appropriate to review what has been written above and to draw from it a series of recommendations. The forthcoming recommendations fall naturally into three categories: those directed to individual managers; those directed to heads of RD&A institutions; and those directed to representatives of multilateral and bilateral sponsors of forestry-related RD&A activities. Although some recommendations repeat what has been written above, together here they create what I regard as an agenda for action.

To Individual Managers

- identify your needs as a manager
 - identify your specific strengths and weaknesses
 - involve your superiors and peers
 - involve selected subordinates
- specify achievable objectives for improving your managerial knowledge, skills, and abilities
- propose appropriate actions to attain your objectives
- include your objectives and proposed actions in your managerial training plan
- gain management's acceptance of and commitment to your plan
- pursue your objectives aggressively
- fulfill your responsibilities for the training of subordinates as managers

To RD&A Institutions

- create an atmosphere that accepts and encourages improvements in management
 - establish improvement of management as a specific goal of the institution
 - specify objectives to be attained in the improvement of management
 - seek from all employees suggestions on how management can be improved
 - urge managers to improve their knowledge, skills, and abilities
 - provide time and resources for managers to improve themselves
- identify needs of specific groups of managers
- identify and use extramural opportunities to provide needed training
- provide intramural training opportunities
 - build a bookshelf on management for self-study by managers
 - subscribe to and route copies of periodicals on management
 - clip and disseminate copies of articles on management
 - organize regular short-courses or workshops on management
 - create competitive managerial training positions
- provide incentives and rewards to individuals who improve their managerial skills

To Multilateral and Bilateral Sponsors

- recognize importance of improving management of RD&A institutions
- provide opportunities for managers to improve their knowledge, skills, and abilities
 - organize short courses on management
 - sponsor managers to attend short-courses and schools of business management
- sponsor consultants on management to assist RD&A institutions
- sponsor production and dissemination of managerial training materials

SUMMARY

A global problem is that managers of forestry-related research, development, and application programs typically lack education or training to fulfill their roles and responsibilities as managers. This problem is increasing in severity as the pace of forestry-related RD&A activities accelerates in developing countries with financing from multilateral and bilateral sponsors. Institutions lead by inadequately prepared managers suffer from inefficiencies and ineffectiveness. They experience difficulties in building and retaining competent staffs and in fulfilling their mandates. A proven way to help solve these problems is to train and educate the leaders of these RD&A institutions in the theory and practice of management.

The needs for training and education of managers of RD&A institutions become obvious upon examination of the topics of concern to first-line supervisors, middle managers, and executives. These topics cover the four resources that must be managed—people, funds, facilities, and information—and the principle functions of managers—supervision, planning, organizing, controlling, evaluating, communicating, leadership, making decisions, and solving problems. Some unique features of RD&A programs—creativity, experimental design, statistical analysis, publications, technical information systems, and networking—require special attention.

That these topics can be taught with good effects to forestry-related RD&A managers has been demonstrated via five short-courses held in Southeast Asia and Africa. These courses have introduced managers in developing countries to the training that is being used in developed countries. These courses, leading to understanding of the theories basic to management and to improved managerial skills, have been enthusiastically received around the world.

But short-courses are only one means of expanding the knowledge, skills and abilities of managers. The science and art of management also can be learned through experience gained on the job, special work assignments, self-study, coaching and tutoring, and attendance at academic courses. Each of these ways of learning has associated advantages and disadvantages.

Executives in each RD&A institution have responsibilities to establish and use policies and procedures for managerial training. Evaluations of the performance of managers should be the occasion for identifying needs for managerial training or education. Each manager should be helped by his or her supervisor to prepare a 3-to 5-year training plan that is endorsed by an executive. The manager and his or her supervisor should share the responsibility for implementation of the training plan.

Recommendations are given for training and educating managers of forestry-related RD&A institutions. The recommendations provide agendas for action by individual managers, by RD&A institutions, and by multilateral and bilateral sponsors of forestry-related RD&A activities.

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APPENDIX A. TOPICS COVERED DURING A THREE-WEEK MANAGERIAL TRAINING COURSE IN MALAYSIA

- Overview of forestry-related research, development, and applications (RD&A) of technology in the region and globally*
- Philosophy of forestry-related RD&A*
- Internal and external environment of an RD&A institution*
- Framework and functions of managing an RD&A institution*
- Planning*
- Organizing*
- Controlling*
- Evaluating*
- Leadership*, motivation*, and supervising subordinates
- Dynamics in groups
- Effective meetings
- Learning styles of individuals
- Communication systems and techniques*
- Cooperation versus competition
- Decision-making*
- Problem-solving
- Delegating authority and responsibility*
- Creativity*
- Managing conflict and change*
- Technology transfer (putting knowledge to use; applications of available technology)
- Personnel (performance evaluation, incentive systems, promotion, staffing)
- Finances (budgets, accounting, audits, obtaining funds, managing under reductions)
- Costs and effectiveness of RD&A institutions*
- Visits to analyze and learn from nearby RD&A institutions
- Opportunities for each individual to improve as a manager
- Commitment and plan to improve one or more managerial situations at home*

* Indicates topics to be covered during a 5- to 7-day training course for executives

LEADERSHIP OF RESEARCH INSTITUTIONS¹

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INTRODUCTION

Leadership is one of the most important elements for the success of any organisation, be it a commercial company, a university, a trade union, a family or a research institute. Poor leadership in any institution is certain prescription for failure no matter how well funded, equipped or staffed. It may be long in coming, but it certainly will.

Leadership is often taken for granted. Some people are born leaders. Some acquire leadership by training and experience. Some others cannot make it at all, no matter their capabilities in other fields. A Nobel Prize Winner, an outstanding physician or engineer could be a failure in a leadership position.

A leader is concerned with leading naturally, with directing, with delegating, implementing and co-ordination. He will be concerned with people, funds, physical infrastructure, information and communication. Leadership concerns the individual, his personal qualities, performance as a chief executive and the institution he leads. This paper will discuss leadership as a basis for improving effectiveness of research. It will cover attributes of leadership, nature of research institutions, leadership challenges in these institutions and lessons for forestry research management in the SADC region.

ATTRIBUTES OF LEADERSHIP

A leader of an institution must have professional competence in the mandate of the institution. He should also have had some achievements based on performance. He needs to have a clear understanding of the mission, national purpose and goals of the organisation. This background will earn him respect within and outside the institution, and enhance co-operation of subordinates. It may also make dealings with peers slightly easier.

A leader has to be a visionary in terms of institutional, programme and manpower development. He must be clear about the direction and goals for his institution in 5, 10, 15 or even 20 years, and how he proposes to get there.

A leader should be a good communicator and public relations operator. These are essential attributes in dealing with subordinates, colleagues, peers and others with whom he must interact in the course of his duties. It is advisable he cultivates contacts with leaders of related institutions such as in the finance and planning ministries and the private sector. An understanding of their culture, their points of view, and their priorities will be an asset in dealings with them.

¹ Paper presented at the Second Regional Workshop on Improvement and Strengthening of Forestry and Forest Products Research Institutions in the SADC Region, Gaborone, Botswana, 21-25 September 1992.

Leadership makes high demands on personal qualities. Anyone in a leadership position or aspires to one, should have a strong but pleasant personality, be dynamic but not aggressive. He should be completely devoid of arrogance as humility pays rich dividends, even in top positions. Honesty, moral soundness and freedom from financial embarrassment are essential attributes for a leader. Personal weakness in any of these qualities will undermine credibility and destroy confidence. This is particularly important as examples are "vocal". No one listens if a leader does one thing and asks his followers to do something different.

A leader should be fair and be seen to be fair. He should have the courage to take decisions based on principles, facts and merit, rather than on pressures from individuals or groups. He should not in any way foster personal, ethnic, or special interests. A leader should be in close touch with the people he leads and make himself easily accessible to them. Their welfare is one of ~~his~~ ^{their} primary concerns, and the least a leader should do is to show genuine interest in the welfare of his staff.

A leader should show self control and therefore be restrained in words and actions. He should do all he can to avoid outbursts as it is sometimes said that a leader loses his right to be angry.

Finally a leader has considerable authority over his staff for good or evil. He should help them as much as possible and use his punitive authority very sparingly.

A leader with all these attributes may never be found, but they can guide the choice and training of leaders, and minimise costly mistakes of bad leadership.

PERCULIARITIES OF RESEARCH INSTITUTIONS

The principles and guidelines of leadership are generally the same irrespective of the type of organisation. However organisations differ in character, and so pose challenges which are peculiar to their goals and programmes. The needs in a university are different from those in a tyre factory; just as those in a pulp mill are different from the needs in a truck haulage company. In the case of research institutions the demands on leadership are influenced by the nature of research itself, its objectives, strategies and products, the men and materials needed for research, and the working environment which research demands.

Research is a high risk business fraught with uncertainties in terms of yielding positive results. "Failures" (negative results) are not unusual and inconclusive results are common also. In research these are not necessarily waste of efforts as they give information which is otherwise not available.

Another peculiarity of research is the non-tangible nature of its products. Information, technologies, innovations and techniques are the outcome of agricultural and forestry research. There are few exceptions, such as new products resulting from process technological research.

Another peculiarity is that research is long term compared with activities of other organisations. For example, it takes 3 - 5 years to adapt a technology and much longer to develop one. It may take another 5 - 7 years to get the technology incorporated into general production practices.

Research concerned with trees has the extra dimension of longevity of these plants, and so results take even longer to obtain.

Another feature is that progress in agricultural and forestry research hardly comes in large technological jumps, but always in small doses, any new advance building on previous ones. These elements are peculiar to research and need to be understood.

The inputs into research also have features not found in most other organisations. First is the people. Researchers need long, specialised and costly training. Without this they are of limited value. They also need a climate for creativity and generation of ideas, for analyses of given and hypothetical situations, and for production of new technologies and innovations. They need minimum administrative control, and unlike in most organisations, a high degree of individuality and aberrant behaviour is tolerated.

Agricultural and forestry research require long term planning involving forecasting future trends, and anticipating future problems. Ideally research should be ahead of development so that information for solving current problems of development, should come from research carried out in previous years. This further compounds the problem of long term nature of research and its endemic high risk. In spite of these uncertainties, mistakes in strategic planning must be avoided, as they are costly and the consequences are destabilizing.

Funding of research is difficult in such circumstances. People are naturally reluctant to commit funds to programmes which are long term and risky.

The peculiarities discussed above characterise research institutions. They form the basis of the challenges to leadership and determine how things should be run. The following section will discuss how these peculiarities actually affect these challenges.

LEADERSHIP CHALLENGES IN RESEARCH INSTITUTIONS

Perhaps the first challenges that face a leader of a research institution are those that emanate from the peculiarities of the institution itself, viz: the nature of research, its products, its slow pace, high risk and uncertainty. There is also the type of personnel, researchers who are expensive, highly trained and who must be given more freedom than is usual in most organisations. These elements are endemic in research institutions and leaders must take them into account in whatever is done. To ignore them will be at a peril as the consequences will surface sooner than later.

Another challenge also endemic in African research institutions is, inadequacies. Funds are limited and so are equipment, vehicles and infrastructure. Research staff are few and limited in specialised training.

Nothing seems enough, as it is a continuous case of managing inadequacies. In such circumstances leadership must decide whether to cover his entire mandate or limit himself to a few key areas, and if so, the basis for prioritisation, whether to use only his staff and facilities or seek assistance or collaboration. None of these is easy. Each presents its challenges and frustrations. Bureaucratic bottlenecks, negative human factors and sometimes rejections are not uncommon. Persistence becomes the watchword otherwise nothing happens.

Another challenge is lack of adequate guidance from government. More often than not, there are no approved agricultural or forestry development policies, objectives and strategies. Those for research are less likely to have been formulated. There is thus no official framework within which to develop your research objectives, strategies and programmes.

In many cases there is also no clear directive as to whether research institutions should concern themselves with research alone (as extension services usually wish), or with research and development, or even with research, development and application. Clarity here will enable focus of activities and a fair basis for assessing the institute's performance.

Research institutes and particularly those concerned with forestry, handicap themselves by paying inadequate attention to information and public relations about their activities, problems and achievements. There is need on a continuous basis to sensitise politicians, planning and finance decision makers, the private sector and even the public, about the continuing urgency and economic relevance of research programmes to national development. Well documented, data-laden brochures put out periodically can partly serve this purpose. The degree of ignorance about activities of research institutes far exceeds what those within the institutions may imagine.

Parallel to this, there may be a dearth of published research findings and conclusions due to delays in analysing experimental data. Information contained in these reports are the "products" of the institute. Leadership must insist on prompt publication of research papers, interim and final reports, reviews and all other forms of documentation. These are essential in assessing the institute's performance, and its contribution to national development. They are also *needed* for staff appraisal.

Communication is another area of major challenge. It has many ramifications; with peers in the department and parent ministry; with ministries of Finance, Planning, and Agriculture; with existing developmental projects, extension services, the private sector and with donor agencies. Often forgotten perhaps is the need for communication with substations and collaborating institutions. These should be fully involved in system-wide planning, monitoring and reporting processes.

Communication can take different forms but two points will be made. First the other person has his own interests, priorities, professional norms and culture. It is necessary to understand these so as to be able to present your programmes or problems in the light of these interests. For example, emphasise income generation to the Ministry of Finance, erosion and income to community leaders; environment, conservation and biodiversity to donors.

The second point is that such presentations need data, analyses and deductions, and not generalised statements which cannot be substantiated. Such data is often lacking because there is usually no systematic effort to collect, analyse and store data for subsequent use in documentation, planning and similar purposes. This is a challenge which must be taken seriously.

Fund raising is perhaps one of the greatest challenges that a research institute leader has to deal with. It is usually a battle to get research funds from governments, but it is also now clear that total dependence on government is no longer advisable. Leaders have to move aggressively into other sources, particularly the private sector and donors. The search for funds from these sources introduces new dimensions to the challenge.

The institute has to earn the confidence of those whose assistance is sought; confidence in the institute's ability to carry out the research, and confidence that the funds will be spent on the intended purposes. In addition projects for such requests have to be properly articulated to focus on areas of interest to the potential donors.

Finally as leader, government has entrusted you with responsibilities for an organisation. What it eventually becomes depends to a large extent, on you. Government will not return with directives on every issue, rather it is you, with the collective wisdom of your institution who should advise government on matters within your mandate. Do not wait to react to situations, try to take the lead, set the pace and stimulate others in areas of your activities.

The challenges outlined in the preceding pages are not exhaustive but they illustrate the magnitude of what any one in a leadership position faces in a research institution. They give enough food for thought and should constantly be on the minds of those who lead and manage research institutions.

The challenge of leadership comes the way of only a few. Any such person particularly in Africa should feel lucky to have an opportunity to contribute significantly to national development. In spite of great limitations, the acid test will be what is done with the little resources made available.

LESSONS FOR FORESTRY RESEARCH IN THE SADC REGION

This second regional workshop on strengthening forestry research institutions in the SADC region brings to an end a two-year comprehensive strategic research planning process. It has gone through identification of national priority problems, formulating research programmes to address them and preparation of national forestry research plans. Based on these, draft regional programmes and projects have been developed. These will now be discussed after which the final proposals will be submitted to the appropriate authorities for consideration and approval. This is the time to start taking the first steps on implementation of these regional programmes. Action may in fact have already begun in respect of the national plans completed many months ago.

A first step will be to revise the plan documents in the light of the outcome of the regional workshop. Prioritisation will be cardinal. You will need to revise priorities between and within programmes.

Justifications of programmes should be strengthened where necessary, particularly with data. Objectives may need to be made more realistic and, targets more specific. Strategies may also need to be revised.

It is essential that this revision is carried out jointly by the institute's scientists and those in other institutions, e.g. universities, which will collaborate in project implementation. Establish clearly who does what if this was not spelt out in the original programme proposal.

Resulting from the prioritisation, you should now focus on a few projects. It is unwise to spread staff too thinly on too many projects. They should not be overloaded so as to leave them time for data analyses and write-up of results. They may also need time to interact with extension services and industry.

It may be desirable to start programme implementation with a reasonably solvable problem so the institute can gain credibility from its success. Continued support may depend on such early successes.

The next step is selling the projects to those who can fund them. Soliciting funds is a major responsibility of institute leaders, a task that should begin to take more of his time than has previously been the case. He must prepare good project requests, pursue and lobby for them in government and other funding agencies. The challenges involved have been discussed in previous sections of this paper. What is actually done will depend on individual circumstances; the national economy, government policies, role of forestry and environment in national development, attitude of donors and the private sector.

At an early stage machinery should be put in place for regular reporting of progress in project implementation. Such reports must be good as they form the basis for judgement of what is being done, for accountability, and as basis for continued support.

There should also be a mechanism for periodic external programme and management review. This will give outside expert opinion on what is being done and it is invariably valuable. External reviews are not common in African research institutions. They serve useful purposes and should be made regular features in institute management.

At an early stage, it is advisable to establish a strong unit for data collection, analysis and storage, for policy and project analyses, for documentation and for information.

CONCLUSION

This paper is written in the hope it can assist heads of forestry research institutions in the SADC region. Some of them are young and others are more experienced. Irrespective of the category, it is hoped this paper will stimulate self examination of how they have met leadership challenges so far, and induce them to critically examine where and how improvements can be made.



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